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"Wie das Geſtirn,
Ohne Haſt
Aber ohne Raſt,
Drehe ſich jeder
Um die eigene Laſt."

GOETHE.

TRANSACTIONS OF THE AMERICAN GYNECOLOGICAL SOCIETY

VOLUME 41

FOR THE YEAR 1916

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NOTE

The Society does not hold itself responsible for the views enunciated in the papers read at its meetings.

LE ROY BROUN, M.D., *Secretary*,
148 W. SEVENTY-SEVENTH STREET, NEW YORK.

OFFICERS AND FELLOWS

OF THE

AMERICAN GYNECOLOGICAL SOCIETY

1916

OFFICERS FOR 1916[1]

PRESIDENT

J. WESLEY BOVÉE, Washington.

VICE–PRESIDENTS

ROBERT L. DICKINSON, New York.
GEORGE GELLHORN, St. Louis.

SECRETARY

Le ROY BROUN, New York.

TREASURER

BROOKE M. ANSPACH, Philadelphia.

OTHER MEMBERS OF THE COUNCIL

HOWARD A. KELLY, Baltimore.
[To serve one year.]

HENRY C. COE, New York.
[To serve two years.]

J. WHITRIDGE WILLIAMS, Baltimore.
[To serve three years.]

THOMAS J. WATKINS, Chicago.
[To serve four years.]

BENJAMIN R. SCHENK, Detroit.
JOSEPH BRETTAUER, New York.
[To serve one year.]

[1] Officers for the ensuing year may be found in the minutes of the meeting, page lii.

LIST OF OFFICERS

FROM THE ORGANIZATION TO THE PRESENT TIME

* Deceased.

	President.	Vice-Presidents.	Secretary.	Treasurer.
1876.	*Fordyce Barker	*Washington L. Atlee, *William H. Byford	*James R. Chadwick	*Paul F. Mundé
1877.	*Fordyce Barker	*Washington L. Atlee, *William H. Byford	*James R. Chadwick	*Paul F. Mundé
1878.	*Edmund R. Peaslee	*William Goodell, *Isaac E. Taylor	*James R. Chadwick	*Paul F. Mundé
1879.	*T. Gaillard Thomas	*D. Humphreys Storer, *Henry P. C. Wilson	*James R. Chadwick	*Paul F. Mundé
1880.	*J. Marion Sims	*W. T. Howard, *Robert Battey	*James R. Chadwick	*Paul F. Mundé
1881.	*W. H. Byford	*T. A. Reamy, *H. F. Campbell	*James R. Chadwick	*Paul F. Mundé
1882.	Thomas Addis Emmet	*George H. Lyman, *Emil Noeggerath	*James R. Chadwick	*Paul F. Mundé
1883.	*Gilman Kimball	*Albert H. Smith, *Theophilus Parvin	Frank P. Foster	*Paul F. Mundé
1884.	*Albert H. Smith	*James R. Chadwick, *Samuel C. Busey	Frank P. Foster	Matthew D. Mann
1885.	*William T. Howard	Wm. L. Richardson, *Paul F. Mundé	Frank P. Foster	Matthew D. Mann
1886.	*Thaddeus A. Reamy	*Theophilus Parvin, *Geo. J. Engelmann	Joseph Taber Johnson	Matthew D. Mann
1887.	*Alex. J. C. Skene	John C. Reeve, *Ellwood Wilson	Joseph Taber Johnson	Matthew D. Mann
1888.	*Robert Battey	*A. Reeves Jackson, *James R. Chadwick	Joseph Taber Johnson	Matthew D. Mann
1889.	*Henry P. C. Wilson	*William T. Lusk, *Edward W. Jenks	Joseph Taber Johnson	Matthew D. Mann
1890.	John P. Reynolds	William M. Polk, *Ely Van de Warker	Joseph Taber Johnson	Matthew D. Mann
1891.	*A. Reeves Jackson	Joseph Taber Johnson, *William H. Baker	Henry Clark Coe	Matthew D. Mann
1892.	*John Byrne	Richard B. Maury, *Cornelius Kollock	Henry Clark Coe	Matthew D. Mann
1893.	*Theophilus Parvin	William H. Parish, *William H. Baker	Henry Clark Coe	Matthew D. Mann
1894.	*William T. Lusk	*Samuel C. Busey, Bache McE. Emmet	Henry Clark Coe	Matthew D. Mann
1895.	Matthew D. Mann	*Geo. J. Engelmann, Clement Cleveland	Henry Clark Coe	J. Montgomery Baldy

	President.	Vice-Presidents.	Secretary.	Treasurer.
1896.	William M. Polk	*James H. Etheridge, *Fernand Henrotin	Henry Clark Coe	J. Montgomery Baldy
1897.	*James R. Chadwick	*R. Stansbury Sutton, *Henry J. Garrigues	J. Riddle Goffe	J. Montgomery Baldy
1898.	*Paul F. Mundé	Emilius C. Dudley, *Arthur W. Johnstone	J. Riddle Goffe	J. Montgomery Baldy
1899.	Joseph Taber Johnson	Howard A. Kelly, *A. F. A. King	J. Riddle Goffe	J. Montgomery Baldy
1900.	*George J. Engelmann	Edward L. Duer, Seth C. Gordon	J. Riddle Goffe	J. Montgomery Baldy
1901.	*Ely Van de Warker	*Charles Jewett, Richard B. Maury	J. Riddle Goffe	J. Montgomery Baldy
1902.	Seth C. Gordon	*George M. Edebohls, Edward Reynolds	J. Riddle Goffe	J. Montgomery Baldy
1903.	*Joseph E. Janvrin	*Edward W. Jenks, *A. Palmer Dudley	J. Riddle Goffe	J. Montgomery Baldy
1904.	Edward Reynolds	J. Whitridge Williams, Edward P. Davis	J. Riddle Goffe	J. Montgomery Baldy
1905.	E. C. Dudley	Henry D. Fry, Henry C. Coe	J. Riddle Goffe	J. Montgomery Baldy
1906.	Richard B. Maury	Howard A. Kelly, Reuben Peterson	J. Riddle Goffe	J. Montgomery Baldy
1907.	Clement Cleveland	Willis E. Ford, J. Clifton Edgar	J. Riddle Goffe	J. Montgomery Baldy
1908.	J. Montgomery Baldy	I. S. Stone, Eugene Boise	J. Riddle Goffe	Charles P. Noble
1909.	J. Riddle Goffe	Howard A. Kelly, Malcolm McLean	Le Roy Broun	J. Wesley Bovée
1910.	Edward P. Davis	Seth C. Gordon, Edward Reynolds	Le Roy Broun	J. Wesley Bovée
1911.	Reuben Peterson	John F. Thompson, John G. Clark	Le Roy Broun	J. Wesley Bovée
1912.	Howard A. Kelly	Richard R. Smith, John A. Sampson	Le Roy Broun	J. Wesley Bovée
1913.	Henry C. Coe	George H. Noble, George Gellhorn	Le Roy Broun	J. Wesley Bovée
1914.	J. Whitridge Williams	Thomas J. Watkins, Howard C. Taylor	Le Roy Broun	J. Wesley Bovée
1915.	Thomas J. Watkins	Frank Farrow Simpson, Howard C. Taylor	Le Roy Broun	J. Wesley Bovée
1916.	J. Wesley Bovée	Robert L. Dickinson, George Gellhorn	Le Roy Broun	Brooke M. Anspach

HONORARY FELLOWS

American

Elected

1914. THOMAS B. ASHBY, M.D., 1125 Madison Avenue, Baltimore, Maryland.
1914. B. F. BAER, M.D., 2115 Chestnut St., Philadelphia, Pa.
1912. B. BERNARD BROWNE, M.D., 510 Park Ave., Baltimore.
1915. HENRY C. COE, M.D., 40 East 41st St., New York.
1914. ANDREW F. CURRIER, M.D., 173 East Lincoln Ave., Mt. Vernon, N. Y.
1914. FRANCIS H. DAVENPORT, M.D., 390 Commonwealth Ave., Boston, Massachusetts.
1912. EDWARD L. DUER, M.D., Odessa, Delaware.
1912. BACHE McE. EMMET, M.D., 535 Park Ave., New York.
1902. THOMAS ADDIS EMMET, M.D., 93 Madison Ave., N. Y. *Founder.*
1915. WILLIS E. FORD, M.D., Utica, New York.
1916. HENRY D. FRY, 1929 19th St., N. W., Washington, D. C.
1905. WILLIAM GARDNER, M.D., 457 Sherbrooke St., W., Montreal, Canada.
1914. EUGENE C. GEHRUNG, M.D., care of Dr. Julian A. Gehrung, 15 E. 48th St., New York.
1915. SETH CHASE GORDON, M.D., Portland, Maine.
1916. PHINEAS H. INGALLS, 1609 Washington St., Denver, Colorado.
1915. JOSEPH TABER JOHNSON, M.D., Cherrydale, Virginia. *Founder.*
1909. MATTHEW D. MANN, M.D., 37 Allen St., Buffalo, N. Y.
1883. RICHARD B. MAURY, M.D., 111 Court St., Memphis, Tenn.
1907. CHAUNCEY D. PALMER, M.D., Avondale, Cincinnati, Ohio.
1897. JOHN C. REEVE, M.D., LL.D., Dayton, Ohio. *Founder.*
1903. WILLIAM L. RICHARDSON, M.D., 225 Commonwealth Ave., Boston. *Founder.*

Foreign

1878. J. AMÉDÉE DOLÉRIS, M.D., 7 Rue de Logelbach, Paris, France.
1909. ALBAN HENRY GRIFFITHS DORAN, F.R.C.S. (England), 6 Palace Mansions, Addison Bridge, Kensington, London.

ELECTED

1899. D. BERRY HART, M.D., 13 Northumberland Street, Edinburgh, Scotland.

1909. MAX HOFMEIER, M.D., Schoenleinster 4, Würzburg, Germany.

1895. CHARLES JACOBS, M.D., care of Dr. S. Squire Spriggs, 423 Strand, London, W. C., England.

1912. J. M. MUNRO KERR, M.D., 7 Clairmont Gardens, Glasgow, Scotland.

1888. AUGUST MARTIN, M.D., Berlin-Schöneberg Freiheer vom Steinstr.

1912. W. NAGEL, M.D., Potsdamerstr. 121h, Berlin W. 35, Germany.

1891. ROBERT OLSHAUSEN, M.D., N. Artillerie St., 19, Berlin, Germany.

1891. S. POZZI, M.D., 47 Avenue d'Iena, Paris, France.

1909. HERBERT R. SPENCER, M.D., 104 Harley St., W. London, Eng.

1901. TH. TUFFIER, M.D., 42 Avenue Gabriel, Paris, France.

Total, thirty-three Honorary Fellows.

HONORARY FELLOWS

DECEASED

Elected

1877. JOHN L. ATLEE, M.D., Lancaster, Pa.
1884. GEORGE GRANVILLE BANTOCK, M.D., London, England.
1910. WILLIAM H. BAKER, M.D., Boston, Massachusetts.
1876. ROBERT BARNES, M.D., London, England.
1892. ROBERT BATTEY, M.D., Rome, Georgia. *Founder.*
1878. JOHN S. BILLINGS, M.D., LL.D., New York.
1897. SAMUEL C. BUSEY, M.D., LL.D., Washington, D. C. *Founder.*
1910. J. CHALMERS CAMERON, M.D., Montreal, Canada.
1890. HENRY F. CAMPBELL, M.D., Augusta, Georgia. *Founder.*
1905. JAMES R. CHADWICK, A.M., M.D., Boston. *Founder.*
1889. M. CHARPENTIER, M.D., Paris, France.
1893. CHARLES J. CULLINGWORTH, M.D., London, England.
1877. JOHN C. DALTON, M.D., New York.
1877. J. A. H. DEPAUL, M.D., Paris, France.
1878. J. MATTHEWS DUNCAN, M.D., London, England.
1888. ALEXANDER DUNLAP, M.D., Springfield, Ohio.
1876. JOSEPH A. EVE, M.D., Augusta, Georgia.
1901. HENRY J. GARRIGUES, M.D., Tryon, North Carolina.
1889. ROBERT P. HARRIS, M.D., Philadelphia.
1888. GRAILY HEWITT, M.D., London, England.
1881. J. BRAXTON HICKS, M.D., London, England.
1902. WILLIAM T. HOWARD, M.D., Baltimore, Md. *Founder.*
1911. JOSEPH E. JANVRIN, M.D., New York.
1876. THOMAS KEITH, M.D., London, England.
1888. GILMAN KIMBALL, M.D., Lowell, Massachusetts.
1891. CHRISTIAN G. LEOPOLD, M.D., Dresden, Germany.
1876. ALFRED H. M'CLINTOCK, M.D., Dublin, Ireland.
1892. OTTAVIO MORISANI, M.D., Naples, Italy.
1888. EMIL NOEGGERATH, M.D., Wiesbaden, Germany. *Founder.*
1877. CHARLES PAJOT, M.D., Paris, France.
1901. KARL PAWLIK, M.D., Prague, Hungary.
1908. J. PFANNENSTIEL, M.D., Kiel, Germany.
1885. W. S. PLAYFAIR, M.D., London, England.

ELECTED

1888. SIR WILLIAM O. PRIESTLEY, LL.D., London, England.
1907. THADDEUS A. REAMY, M.D., Cincinnati, Ohio.
1901. M. SAENGER, M.D., Prague.
1877. F. W. VON SCANZONI, M.D., Würzburg, Bavaria.
1896. PAUL SEGOND, M.D., Paris, France.
1876. CARL SCHROEDER, M.D., Berlin, Germany.
1876. GUSTAV SIMON, M.D., Heidelberg, Germany.
1888. SIR ALEXANDER R. SIMPSON, KT., Edinburgh, Scotland.
1888. D. HUMPHREYS STORER, M.D., Boston. *Founder.*
1905. R. STANSBURY SUTTON, M.D., Pittsburgh, Pa.
1882. LAWSON TAIT, ESQ., Birmingham, England.
1881. S. TARNIER, M.D., Paris, France.
1888. ISAAC E. TAYLOR, M.D., New York. *Founder.*
1893. T. GAILLARD THOMAS, M.D., New York. *Founder.*
1882. J. KNOWSLEY THORNTON, ESQ., London, England.
1909. ELY VAN DE WARKER, M.D., Syracuse, N. Y.
1886. SIR SPENCER WELLS, BART., London, England.
1881. FRANZ VON WINCKEL, M.D., Munich, Germany.
1876. MARMADUKE B. WRIGHT, M.D., Cincinnati.

ACTIVE FELLOWS

1915.—Adair, Fred L., B.S., M.D., F.A.C.S. Associate Professor of Obstetrics, University of Minnesota; Chief of Division of Obstetrics and Gynecology, Minneapolis City Hospital; Assistant Chief of Obstetrics and Gynecology, University of Minnesota Hospital; Obstetrician and Gynecologist to St. Andrew's Hospital. 2218 South Colfax Avenue, Minneapolis, Minnesota.

1906.—Andrews, Frank T., A.M., M.D., F.A.C.S. Professor of Clinical Gynecology, Northwestern University Medical School; Gynecologist to Mercy and Wesley Hospitals and South Side Dispensary. 448 Barry Avenue, Chicago, Ill.

1909.—Anspach, Brooke M., M.D., F.A.C.S. Gynecologist and Obstetrician to the Philadelphia and the Stetson Hospitals; Associate in Gynecology, University of Pennsylvania; Assistant Gynecologist, University Hospital; Surgeon to the Gynecean Hospital. *Treasurer.* 1827 Spruce Street, Philadelphia.

1895.—Ashton, William Easterly, M.D. Professor of Gynecology in the Medico-Chirurgical College and Hospital, Graduate School of Medicine of the University of Pennsylvania; one of the Founders of the Congrès International de Gynécologie et d'Obstétrique; formerly Professor of Gynecology in the Medico-Chirurgical College, Philadelphia. 2011 Walnut Street, Philadelphia.

1889.—Baldy, J. Montgomery, M.D., F.A.C.S. Emeritus Professor of Gynecology, Philadelphia Polyclinic; Consulting Surgeon to the Gynecean Hospital; Consulting Surgeon to the Jewish and the Frederick Douglas Hospitals; President of the Pennsylvania Bureau of Medical Education and Licensure. *Treasurer,* 1894–1907. *President,* 1908. *Council,* 1909–1912. 2219 De Lancey Place, Philadelphia.

1916.—Bailey, Harold Capron, M.D., F.A.C.S. Assistant Obstetrician to Bellevue Hospital; Assistant Obstetrician to

Manhattan Maternity Hospital; Assistant Surgeon, General Memorial Hospital. 269 Lexington Avenue, New York.

1908.—Bissell, Dougal, M.D., F.A.C.S. Surgeon to the Woman's Hospital in the State of New York; Consulting Surgeon to the State Hospital (Insane), Central Islip, L. I. 219 W. Seventy-ninth Street, New York.

1896.—Boise, Eugene, A.B., M.D. Consulting Physician to Butterworth Hospital. *Vice-President*, 1908. Grand Rapids, Michigan.

1888.—Boldt, Hermann J., M.D., F.A.C.S., M.R.C., U. S. A. Consulting Gynecologist to the German Poliklinik; Consulting Gynecologist to the Beth Israel Hospital, and to the Philanthropic Hospital; Professor of Diseases of Women, New York Post-Graduate Medical School and Hospital; Fellow of the Royal Society of Medicine and International Gynecological Societies, and of the Southern Surgical and Gynecological Society; Consulting Gynecologist to St Vincent's Hospital; Member of Gynecological Society of Germany; Gynecologist to Post-Graduate Hospital. 39 East Sixty-first Street, New York.

1897.—Bovée, J. Wesley, M.D., F.A.C.S. Professor of Gynecology, George Washington University; Gynecologist to Columbia and George Washington University Hospitals, and St. Elizabeth's Hospital for the Insane. *President*, 1916. *Treasurer*, 1909–1915. The Rochambeau, 815 Connecticut Avenue, Washington, D. C.

1909.—Brettauer, Joseph, M.D., F.A.C.S. Attending Gynecologist to Mt. Sinai Hospital, New York; Consulting Gynecologist to New Jersey State Hospital, Greystone Park, N. J., and to the United Hospital, Portchester, N. Y. *Council*, 1916. 1063 Madison Avenue, New York.

1905.—Broun, Le Roy, B.S., M.D., F.A.C.S. Surgeon to Woman's Hospital in the State of New York; Surgeon to Manhattan State Hospital. *Secretary*, 1909–1916. 148 West Seventy-seventh Street, New York.

1898.—Burrage, Walter L., A.M., M.D. Formerly Gynecologist to St. Elizabeth's and the Carney Hospitals. 282 Newbury Street, Boston, Massachusetts.

1889.—Byford, Henry T., M.D., F.A.C.S. Emeritus Professor of Gynecology, University of Illinois. Peoples Gas Building, cor. Michigan Avenue and Adams St., Chicago.

1915.—Chalfant, Sidney A., B.S., M.D., F.A.C.S. Gynecologist to Allegheny General Hospital, St. Margaret's Memorial Hospital, Pittsburgh; Columbia Hospital, Wilkinsburg. 7048 Jenkins Arcade Bldg., Pittsburgh, Pa.

1913.—Child, Charles Gardner, Jr., M.D. Professor of Gynecology in the New York Polyclinic; Consulting Gynecologist to St. Faith's Home; Attending Gynecologist to City Hospital. 163 East Seventy-first Street, New York.

1903.—Chipman, Walter William, M.D., F.A.C.S., F.R.C.S. (Edin.). Professor of Obstetrics and Gynecology, McGill University; Gynecologist to the Royal Victoria Hospital; Obstetric Physician to the Montreal Maternity Hospital. *Council*, 1912. 285 Mountain Street, Montreal, Canada.

1903.—Clark, John G., M.D., F.A.C.S. Professor of Gynecology, University of Pennsylvania; Gynecologist-in-Chief, University Hospital; Consulting Gynecologist to the Jewish and Bryn Mawr, Germantown, Chestnut Hill and other hospitals; Chairman Section Diseases of Women and Obstetrics, American Medical Association, 1910. *Vice-President*, 1911. 2017 Walnut Street, Philadelphia.

1916.—Clark, Samuel M. D., B.Sc., M.D., F.A.C.S. Professor of Gynecology and Clinical Obstetrics, Tulane University; Head of Department of Gynecology, Tulane University; Visiting Surgeon, Charity Hospital, New Orleans. 108 Baronne Street, New Orleans, La.

1889.—Cleveland, Clement, A.M., M.D., F.A.C.S. Surgical Director to the Woman's Hospital in the State of New York; Consulting Gynecologist to General Memorial Hospital. *Vice-President*, 1895. *President*, 1907. *Council*, 1894, 1908–1912. Office: 40 East Forty-first Street. Residence: 925 Park Avenue, New York.

1896.—Cragin, Edwin B., A.B., A.M. (Hon.), M.D., F.A.C.S. Professor of Obstetrics and of Gynecology, College of Physicians and Surgeons, New York; Attending Obstetrician and Gynecologist to the Sloane Hospital for Women; Consulting Gynecologist to the Presbyterian, the Roosevelt, and Lincoln Hospitals, to the New York Infirmary for Women and Children, and to St. Luke's Hospital, Newburg, N. Y.; Consulting Obstetrician to the City Maternity, Italian, New York Nursery and Child's Hospitals. 10 West Fiftieth Street, New York.

1909.—Crossen, Harry Sturgeon, M.D., F.A.C.S. Associate in Gynecology, Washington University Medical School and Associate Gynecologist to the Barnes Hospital; Gynecologist to St. Luke's, Mullanphy, and St. Louis Maternity Hospitals, and the Missouri Baptist Sanitarium. Metropolitan Building, St. Louis, Missouri.

1904.—Cullen, Thomas S., M.B., F.A.C.S. Associate Professor of Gynecology, Johns Hopkins University; Assistant Gynecologist, Johns Hopkins Hospital; Consulting Gynecologist, Church Home and Infirmary. *Council*, 1914. 20 E. Eager St., Baltimore, Maryland.

1914.—Curtis, Arthur H., B.S., M.D., F.A.C.S. Junior Gynecologist, St. Luke's Hospital; Associate in Gynecology, Northwestern Medical School. 104 South Michigan Avenue, Chicago, Illinois.

1891.—Davis, Edward P., A.M., M.D., F.A.C.S. Professor of Obstetrics, Jefferson Medical College; Obstetrician to the Jefferson Hospital; Obstetrician and Gynecologist to Philadelphia Hospital; Consultant to the Preston Retreat; Member (Founder) International Congress of Obstetrics and Gynecology; Honorary Member of Chicago Gynecological Society; Academy of Surgery, Bucharest; Medical Society of of Virginia; Member of College of Physicians of Philadelphia; Philadelphia Obstetrical Society. *Council*, 1896–1899. *Vice-President*, 1904. *President*, 1910. *Council*, 1911–1914. 250 South Twenty-first Street, Philadelphia.

1892.—Dickinson, Robert L., M.D., F.A.C.S. Senior Gynecologist and Obstetrician, Brooklyn Hospital; Consulting Obstetrician, Methodist Episcopal Hospital; Consulting Gynecologist to several small hospitals. *Vice-President*, 1916. 168 Clinton Street, Brooklyn, New York.

1886.—Dudley, Emilius Clark, A.B., M.D., F.A.C.S. Professor of Gynecology, Northwestern University Medical School; Fellow of the Royal Society of Medicine. *Council*, 1891, 1893, 1906–1909. *Vice-President*, 1898. *President*, 1905. 122 South Michigan Avenue, Chicago.

1893.—Edgar, James Clifton, Ph.B., A.M., M.D., F.A.C.S. Professor of Obstetrics and Clinical Midwifery, Cornell University Medical College of New York; Attending Surgeon to the Manhattan Maternity Hospital; Attending Obstetrician to Bellevue Hospital; Consulting Obstetrician to the New York

Maternity, the Jewish Maternity, and the Greenwich (Conn.) Hospitals. *Vice-President*, 1907. 28 West Fifty-sixth Street, New York.

1907.—Ehrensfest, Hugo, M.D. Professor of Obstetrics and Gynecology, St. Louis University; Physician-in-Chief, St. Louis Obstetric Dispensary; Obstetrician, Jewish Hospital; Visiting Gynecologist, St. Louis City Hospital. 4333 McPherson Avenue, St. Louis, Missouri.

1904.—Findley, Palmer, B.S., M.D., F.A.C.S. Professor of Gynecology and Operative Obstetrics, College of Medicine, University of Nebraska. *Council*, 1913. 3602 Lincoln Boulevard, Omaha, Nebraska.

1913.—Foulkrod, Collin, M.D. Demonstrator of Clinical Obstetrics in Jefferson Medical College; Obstetrician to the Presbyterian Hospital; Assistant Obstetrician to the Philadelphia General Hospital. 4005 Chestnut St., Philadelphia.

1912.—Frank, Robert Tilden, B.A., M.A., M.D. Associate Gynecologist, Mount Sinai Hospital. 983 Park Avenue, New York.

1904.—Gellhorn, George, M.D., F.A.C.S. Associate in Gynecology, Washington University; Gynecologist to St. Luke's Hospital and Barnard Free Skin and Cancer Hospital; Visiting Gynecologist to St. Louis City Hospital; Assistant Gynecologist to Barnes Hospital; Consulting Obstetrician to St. Louis Maternity Hospital; Fellow of Deutsche Gesellschaft für Gynäkologie; Non-resident Member of Gynecological Society of Berlin; Honorary Member of Chicago Gynecological Society. *Vice-President*, 1913 and 1916. 713 Metropolitan Building, St. Louis, Missouri.

1891.—Goffe, J. Riddle, Ph.B., Ph.M., A.M., M.D., F.A.C.S. Fellow of the College of Surgeons of America; President of the Seventh International Congress for Obstetrics and Gynecology; Honorary Fellow, Société Belge de Gynecology et Obstétrique; Professor of Gynecology, New York Polyclinic Medical School and Hospital, and Dartmouth Medical College; Senior Surgeon to the Woman's Hospital in the State of New York; Consulting Gynecologist to New York City Hospital, to St. Joseph's Hospital, Yonkers, N. Y., to Mt. Vernon Hospital, Mt. Vernon, N. Y., and to the Lawrence Hospital, Bronxville. *Council*, 1896. *Secretary*, 1897–1908. *President*, 1909. *Council*, 1910–1913. 171 West Seventy-first Street, New York.

1911.—Goodall, James R., B.A., M.D., C.M., D.Sc. Assistant Professor of Gynecology and Lecturer on Obstetrics, McGill University; Assistant Gynecologist to the Royal Victoria Hospital; Assistant Obstetric Physician to the Montreal Maternity Hospital; Surgeon-in-Chief to the Samaritan Hospital for Women; Consulting Gynecologist to the General Hospital, Saranac, N. Y., and Alice Hyde Hospital, Malone, N. Y.; Consulting Gynecologist to the Herschel Institute, Montreal. Served in the War as Chief Medical Officer of Canadian 5th Mounted Rifles, presently in charge of Hospital at Shornecliffe, England. 27 Bishop Street, Montreal, Canada.

1913.—Graves, William P., A.B., M.D., F.A.C.S. Surgeon-in-Chief to the Free Hospital for Women, Brookline; Professor of Gynecology, Harvard Medical School; Consulting Physician, Boston Lying-in Hospital. 244 Marlborough Street, Boston.

1886.—Green, Charles M., A.B., M.D., Professor of Obstetrics and Gynecology (Emeritus), Harvard University; Senior Surgeon for Diseases of Women, Boston City Hospital; Consulting Physician to the Boston Lying-in Hospital, to the Adams Nervine Asylum, and to the State Hospital at Tewksbury; Ex-President of the Obstetrical Society of Boston, and of the Boston Society for Medical Improvement. *Council*, 1895, 1899. 78 Marlborough Street, Boston, Massachusetts.

1895.—Harris, Philander A., M.D., F.A.C.S. Gynecologist and Obstetrician to the Paterson General Hospital; Gynecologist to the Passaic General Hospital; Consulting Gynecologist to the Miriam Barnert Hospital and to the New Jersey State Hospital; Corresponding Member of the Obstetrical and Gynecological Society of Paris, France (1895); First Vice-President of the American Medical Association (1913); Fellow of the Society of Surgeons of New Jersey. 26 Church Street, Paterson, N. J.

1894.—Harrison, George Tucker, M.A., M.D., F.A.C.S. Consulting Surgeon to Woman's Hospital; formerly Consulting Obstetrician to Nursery and Child's Hospital; formerly Consulting Gynecologist to the Misericordia Hospital; formerly Surgeon to St. Elizabeth's Hospital; Honorary Fellow, Medical Society of Virginia. *Council*, 1909–1910. University of Virginia, Virginia.

1913.—Heaney, Noble Sproat, A.B., M.D., F.A.C.S. Assistant Professor of Obstetrics and Gynecology in Rush

Medical College; Assistant Attending Obstetrician and Gynecologist to the Presbyterian Hospital. 104 South Michigan Avenue, Chicago, Illinois.

1891.—Hirst, Barton Cooke, A.B., M.D., LL.D., F.A.C.S. Professor of Obstetrics, University of Pennsylvania; Gynecologist to the Howard and Orthopedic Hospitals; Consulting Obstetrician to the Lying-in Charity, Preston Retreat, and Newport Hospitals. 1821 Spruce Street, Philadelphia.

1916.—Holden, Frederick Clark, M.D., F.A.C.S. Clinical Professor of Obstetrics and Gynecology of Long Island College Hospital; Associate Attending Obstetrician, Long Island College Hospital. 198 Lincoln Place, Brooklyn, N. Y.

1913.—Huggins, Raleigh R., M.D., F.A.C.S. Gynecologist to St. Francis' Hospital; Associate Professor of Gynecology, University of Pittsburgh. 1018 Westinghouse Building, Pittsburgh, Pa.

1916.—Hunner, Guy Le Roy, B.Sc., M.D., D.Sc., F.A.C.S. Associate in Clinical Gynecology, Johns Hopkins University 2305 St. Paul Street, Baltimore, Md.

1916.—Hutchins, Henry Talbot, A.B., M.D., F.A.C.S. Assistant Gynecologist Harvard Medical School; Consulting Gynecologist, Frost Hospital, Chelsea Hospital and Memorial Hospital, Pawtucket. 130 Dudley Road, Newton Centre, Mass.

1895.—Jarman, George W., A.M., M.D., F.A.C.S. Consulting Gynecologist, General Memorial Hospital; Consulting Gynecologist, St. Joseph's Hospital, Paterson, New Jersey. 54 West Seventy-sixth Street, New York.

1887.—Kelly, Howard Atwood, B.A., M.D., LL.D., F.A.C.S. Professor of Gynecological Surgery, Johns Hopkins University; Gynecologist to the Johns Hopkins Hospital; Honorary Member, Royal Medical Society of Edinburgh; Honorary Member, Italian Society of Obstetrics and Gynecology, Rome; Honorary Member, Society of Gynecology and Obstetrics, Berlin; Member of Society of Obstetrics, Leipzig; Honorary Fellow, Edinburgh Obstetrical Society; Honorary Fellow, Royal Academy of Medicine, Ireland; Honorary Fellow, Glasgow Obstetrical and Gynecological Society; Corresponding Member, Society of Obstetrics and Gynecology, Paris; Corresponding Member, Society of Surgery, Paris; Corresponding Member, Royal Society of Physicians, Vienna;

Fellow, British Gynecological Society; Member, French Urological Association, Paris; Honorary Member, Society of Gynecology and Obstetrics, Belgium. *Vice-President*, 1899 and 1906. *President*, 1912. *Council*, 1913–1915. 1418 Eutaw Place, Baltimore, Md.

1892.—Kirkley, Cyrus A., M.D., F.A.C.S. 432 South Serrano Avenue, Los Angeles, California.

1891.—Krug, Florian, M.D. Consulting Gynecologist to the German Hospital. 616 Madison Avenue, New York.

1913.—Little, Herbert M., M.D., F.A.C.S. Assistant Professor of Obstetrics and Lecturer on Gynecology, McGill University; Assistant Accoucheur, Montreal Maternity Hospital; Assistant Gynecologist, Montreal General Hospital; Assistant Surgeon to the Samaritan Hospital of Montreal; with Canadian Expeditionary Forces in France. 161 Stanley Street, Montreal, Canada.

1916.—Litzenberg, Jennings Crawford, B.Sc., M.D., F.A.C.S. Professor of Obstetrics and Gynecology, University of Minnesota; Chief of Department of Obstetrics and Gynecology; Chief of Staff, Out-patient Department, University of Minnesota Hospital. 910 Donaldson Building, Minneapolis, Minn.

1916.—Lynch, Frank Worthington, A.B., M.D., F.A.C.S. Professor of Obstetrics and Gynecology, University of California; Director of Woman's Clinic, University Hospital. 2511 Broadway, San Francisco.

1913.—McGlinn, John A., M.D., M.S. Formerly Assistant Professor of Obstetrics, Medico-Chirurgical College; Assistant Obstetrician, Medico-Chirurgical Hospital; Gynecologist to St. Agnes' Hospital; Obstetrician to St. Vincent's Maternity Hospital; Gynecologist and Obstetrician to Philadelphia General Hospital. 113 South Twentieth Street, Philadelphia, Pa.

1892.—McLean, Malcolm, M.D. Surgeon to St. Andrew's Infirmary for Women; Consulting Gynecologist to Randall's Island Hospitals; Associate Surgeon to the Woman's Hospital. *Vice-President*, 1909. 40 E. Forty-first Street, New York.

1916.—McMurtry, Lewis Samuel, M.D., LL.D., F.A.C.S. President of Medical Faculty and Professor of Abdominal Surgery and Gynecology, University of Louisville Medical Department; Surgeon to Louisville City Hospital; Surgeon to John N. Norton Memorial Hospital. The Atherton, Louisville, Ky.

1901.—Manton, Walter Porter, M.D., F.A.C.S. Head and Professor of Department of Obstetrics and Clinical Gynecology, Detroit College of Medicine and Surgery; Gynecologist to Harper Hospital and to the Eastern and Northern Michigan Asylums for the Insane; Consulting Gynecologist to St. Joseph's Retreat; Visiting Obstetrician and President of Medical Board, Woman's Hospital and Infant's Home; President, Wayne County Medical Society, 1908–1909; Chairman, Section on Obstetrics and Diseases of Women, American Medical Association, 1908–1909; Fellow of the Royal Society of Medicine. 32 Adams Avenue, Detroit, Michigan.

1908.—Martin, Franklin H., M.D., F.A.C.S. Professor of Gynecology, Post-Graduate Medical School of Chicago; Secretary General Clinical Congress of Surgeons of North America; Editor *Surgery, Gynecology and Obstetrics;* General Secretary of the American College of Surgeons. 30 North Michigan Avenue, Chicago.

1916.—Miller, Charles Jefferson, M.D., F.A.C.S. Professor of Obstetrics and Clinical Gynecology, Tulane University Medical School; Chief of Division of Obstetrics and Gynecology, Charity Hospital. 1638 Joseph Street, New Orleans, La.

1909.—Miller, Gideon Brown, B.Sc., M.D., F.A.C.S. Attending Gynecologist to the Emergency Hospital and to the Garfield Hospital; Associate Gynecologist to the Columbia Hospital; Clinical Professor of Gynecology in the George Washington University. 1730 K Street, N. W., Washington, D. C.

1894.—Montgomery, Edward E., A.M., M.D., LL.D., F.A.C.S. Professor of Gynecology, Jefferson Medical College; Gynecologist to Jefferson Medical College and to St. Joseph's Hospitals. 1426 Spruce Street, Philadelphia.

1912.—Morley, William Horace, Ph.B., M.D., F.A.C.S. Formerly director of Obstetrics, Detroit General Hospital; Consulting Obstetrician to the House of Providence Hospital; Pathologist to the Woman's Hospital and Infant's Home; Obstetrician-in-Chief to the Hanna Schloss Dispensary. Addison Hotel, Detroit, Michigan.

1904.—Newell, Franklin Spilman, A.B., M.D., F.A.C.S. Obstetrician to Massachusetts General Hospital; Assistant Visiting Physician, Boston Lying-in Hospital; Visiting Surgeon, Department of Diseases of Women, Boston City Hos-

pital; Assistant Professor of Obstetrics and Gynecology, Harvard University. *Council*, 1912 and 1915. 443 Beacon Street, Boston, Mass.

1894.—Newman, Henry Parker, A.M., M.D., F.A.C.S. Professor Emeritus of Gynecology, College of Physicians and Surgeons, Illinois University, Chicago, and in the Chicago Polyclinic Medical School and Hospital. Formerly President of Chicago Post-Graduate Medical School and Chairman of Section on Obstetrics and Gynecology of American Medical Association; Founder and President of Marion Sims' Hospital, Chicago, 1895–1908; U. S. Secretary of Section on Abdominal Surgery and Gynecology, Pan-American Congress, 1901–08; A Founder-Member of the Congrés Periodique International de Gynécologie et d'Obstétrique; Attending Surgeon and Gynecologist, Agnew Hospital and San Diego County Hospital. 1560 Eighth Street, San Diego, California.

1916.—Nicholson, William R., A.B., M.D. Gynecologist to Methodist and Polyclinic Hospitals; Obstetrician to Presbyterian Hospital. 1731 Pine Street, Philadelphia, Pa.

1891.—Noble, Charles P., M.D., Sc.D. *Council*, 1899. *Treasurer*, 1908. Easton, Maryland.

1902.—Noble, George Henry, M.D., F.A.C.S. Gynecologist to the Grady Hospital; Professor of Clinical Gynecology, Atlanta Medical College. *Vice-President*, 1913. 186 South Pryor Street. 980 Peachtree Street, Atlanta, Georgia.

1914.—Norris, Charles C., M.D., F.A.C.S. Instructor in Gynecology, University of Pennsylvania; Assistant Gynecologist to the Hospital, University of Pennsylvania; Physician to the Philadelphia Maternity Hospital. 1503 Locust Street, Philadelphia, Pa.

1893.—Norris, Richard C., A.M., M.D. Assistant Professor of Obstetrics, Medical Department, University of Pennsylvania; Surgeon-in-Charge, Preston Retreat; Gynecologist to the Methodist Episcopal Hospital; Consulting Gynecologist, Friends' Asylum, Frankford; Consulting Obstetrician, Germantown Hospital; Consulting Obstetrician and Gynecologist, Philadelphia Hospital. 500 North Twentieth Street, Philadelphia.

1897.—Peterson, Reuben, A.B., M.D., F.A.C.S. Professor of Obstetrics and Gynecology, University of Michigan; Obstetrician and Gynecologist to the University of Michigan Hospital;

Medical Director, University Hospital. *Vice-President*, 1906. *President*, 1911. *Council*, 1912–1915. Ann Arbor, Michigan.

1908.—Polak, John Osborn, M.Sc., M.D., F.A.C.S. Professor of Obstetrics and Gynecology, Long Island College Hostal; Obstetrician and Gynecologist to the College Hospital; Consulting Obstetrician to the Methodist Episcopal Hospital; Gynecologist to the Jewish Hospital; Consulting Gynecologist to the Bushwick, Coney Island, Williamsburg, Deaconess', and People's Hospitals; Consulting Obstetrician to Mary Hitchcock Hospital, Hanover, New Hampshire. 287 Clinton Ave., Brooklyn, N. Y.

1881.—Polk, William Mecklenburg, M.D., LL.D., F.A.C.S. (LL.D. Columbia University of the South and University of Georgia). Dean of Cornell University Medical College; Professor of Gynecology, Cornell University Medical School; Consulting Gynecologist to Bellevue Hospital, to St. Luke's and St. Vincent's Hospitals, to the New York Lying-In Hospital, and to the New York Infirmary for Women and Children; President New York Academy of Medicine, 1910–14; President of New York Obstetrical Society, 1884; Southern Surgical and Gynecological Association; Société Obstétrique et Gynécologie, Paris, France; Royal Society of Medicine, England; Société Belge de Gynécologie et Obstétrique, Brussels; Congrés Periodique Int. de Gynécologie et Obstétrique et de Pédiatrie; Founder; Société Int. de Chirurgie; the Continental Anglo-American Medical Society of Paris; Vice-President, American Association for Advancement of Science. *Vice-President*, 1890. *Council*, 1891. *President*, 1896. *Council*, 1897–1901. 310 Fifth Avenue, New York.

1915.—Rawls, Reginald M., A.B., M.D., F.A.C.S. Junior Surgeon to the Woman's Hospital, Secretary of New York Obstetrical Society. 350 West 88th Street, New York.

1916.—Reed, Charles Alfred Lee, A.M., M.D., F.A.C.S. Professor of Clinical Gynecology Ohio-Miami Medical College; Gynecologic Surgeon to Cincinnati Hospital, German Deaconess' Hospital, Good Samaritan Hospital and Jewish Hospital. The Groton, Cincinnati, Ohio.

1890.—Reynolds, Edward, M.D., F.A.C.S. *Council*, 1894–96. *Vice-President*, 1902 and 1910. *President*, 1904. *Council*, 1905–1908. 321 Dartmouth Street, Boston, Mass.

1896.—Robb, Hunter, M.D. 56 Brattle Street, Cambridge, Mass.

1906.—Sampson, John A., M.D. Professor of Gynecology, Albany Medical College; Gynecologist to the Albany Hospital and South End Dispensary. *Council*, 1911. *Vice-President*, 1912. 180 Washington Avenue, Albany, New York.

1911.—Schenck, Benjamin R., A.B., M.D., F.A.C.S. Attending Gynecologist to Harper Hospital; Consulting Obstetrician to the Woman's Hospital; Associate Professor of Gynecology, Detroit College of Medicine and Surgery. David Whitney Building, Detroit, Michigan.

1914.—Schumann, Edward A., A.B., M.D. Gynecologist and Obstetrician, Philadelphia General Hospital; Gynecologist, Frankford Hospital; Consulting Gynecologist, Rush Hospital for Tuberculous; Demonstrator of Obstetric Pathology, Jefferson Medical College; Lieutenant, New Reserve Corps, U. S. Navy. 1823 Chestnut Street, Philadelphia, Pa.

1907.—Simpson, Frank Farrow, A.B., M.D., F.A.C.S. Gynecologist, Allegheny General Hospital; Secretary-General of the Seventh International Congress for Obstetrics and Gynecology. *Vice-President*, 1915. 7048 Jenkins Arcade Building, Pittsburgh, Pa.

1914.—Slemons, Josiah Morris, A.B., A.M., M.D., F.A.C.S. Professor of Obstetrics and Gynecology, Yale University; Attending Obstetrician and Gynecologist, New Haven Hospital; Chief Obstetrician and Gynecologist, New Haven Dispensary. 284 Orange Street, New Haven, Connecticut.

1905.—Smith, Richard R., M.D., F.A.C.S. Surgeon to Butterworth Hospital. *Council*, 1911. *Vice-President*, 1912. Grand Rapids, Michigan.

1898.—Stone, Isaac S., M.D., F.A.C.S. Professor of Gynecology, University of Georgetown; Gynecologist to Columbia Hospital for Women, and to the Georgetown University Hospital; Fellow of the Royal Society of Medicine, London, England; President, Washington Obstetrical and Gynecological Society, 1907–1909. *Vice-President*, 1908. Connecticut Avenue and L Street, N. W., Washington, D. C.

1905.—Stone, William Stephen, A.B., M.D. 162 East Sixty-third Street, New York.

1909.—Studdiford, William Emery, B.A., M.A., M.D., F.A.C.S. Professor of Gynecology, New York University; Gynecologist to Bellevue Hospital; Attending Obstetrician to the New York Nursery and Child's Hospital; Consulting Surgeon

to the Franklin Hospital, Franklin, New Jersey. *Council*, 1914. 124 East Thirty-sixth Street, New York.

1906.—Taussig, Frederick Joseph, A.B., M.D., F.A.C.S. Associate in Gynecology, Washington University; Gynecologist to Barnard Free Skin and Cancer Hospitals; Obstetrician to St. Louis Maternity Hospital; Gynecologist to the St. Louis City Hospital and City Sanitarium. *Council*, 1915. 731 Metropolitan Building, St. Louis, Missouri.

1905.—Taylor, Howard, C., Ph.B., M.D., F.A.C.S. Attending Gynecologist, Roosevelt Hospital; Professor of Clinical Gynecology, Columbia University; Consulting Gynecologist, Tarrytown, Stamford, and Greenwich (Conn.) Hospitals. *Vice-President*, 1914 and 1915. 32 West Fiftieth St., New York.

1898.—Thompson, John F., A.M., M.D., F.A.C.S. Professor of Diseases of Women, Medical School of Maine (now Bowdoin Medical College); Surgeon, Maine General Hospital; Consulting Gynecologist, Webber Hospital, Biddeford. *Vice-President*, 1911. 211 State Street, Portland, Maine.

1897.—Vineberg, Hiram N., M.D., F.A.C.S. Attending Gynecologist to Mt. Sinai Hospital; Visiting Gynecologist to Har Moriah Hospital; Consulting Gynecologist to the Montefiore Home for Chronic Invalids. 751 Madison Ave., New York.

1903.—Wakefield, W. Francis B., M.B., M.D.C.M., F.A.C.S. 1525 Sutter Street, San Francisco, Cal.

1909.—Ward, George Gray, Jr., M.D., F.A.C.S. Formerly Professor of Diseases of Women, New York Post-Graduate Medical School; Assistant Professor, in charge of the Department of Gynecology, Cornell University Medical College; Gynecologist to Bellevue Hospital; Obstetrician to Misericordia Hospital; Associate-Surgeon, Woman's Hospital; Consulting Gynecologist to New York Post-Graduate Hospital, Monmouth Memorial Hospital, Long Branch, N. J., the Italian Hospital, and the Salvation Army Rescue Home, New York City. *Council*, 1913. 71 West Fiftieth Street, New York.

1896.—Watkins, Thomas J., M.D., F.A.C.S. Professor of Clinical Gynecology, Northwestern University Medical School; Gynecologist to St. Luke's Hospital, Chicago. *Vice-President*, 1914. *President*, 1915. *Council*. 104 S. Michigan Boulevard, Chicago.

1915.—Watson, Benjamin Philip, M.B., Ch.B., M.D., F.R.C.S., F.A.C.S. Professor of Obstetrics and Gynecology,

University of Toronto; Obstetrician and Gynecologist-in-Chief, Toronto General Hospital; Surgeon in British Army in Greece. 14 Madison Avenue, Toronto, Canada.

1898.—Webster, J. Clarence, B.A., M.D. (Edin.), F.R.C.P.E., F.R.S.E., F.A.C.S. Professor of Obstetrics and Gynecology, Rush Medical College, University of Chicago; Gynecologist, Presbyterian and St. Joseph's Hospitals; Fellow of the Edinburgh Obstetrical Society; Corresponding Member of the Royal Academy of Palermo, Italy, and of the Italian Obstetrical and Gynecological Society. 920 Monroe Bldg., 104 South Michigan Boulevard, Chicago, Ill.

1902.—Wells, Brooks H., M.D., F.A.C.S. Professor Emeritus of Gynecology in the New York Polyclinic Medical School and Hospital; Consulting Surgeon to the Brattleboro Memorial Hospital, Brattleboro, Vt.; Consulting Gynecologist to the Beth Israel Hospital, New York; Associate Surgeon to the Woman's Hospital in the State of New York; Editor of *American Journal of Obstetrics*. 523 Madison Avenue, New York.

1916.—Werder, Xavier Oswald, M.D., F.A.C.S. Professor of Gynecology, University of Pittsburgh. Jenkins Arcade Building, Pittsburgh, Pa.

1892.—Williams, J. Whitridge, A.B., M.D., Sc.D., LL.D., F.A.C.S. Professor of Obstetrics, and Dean of Medical Department of Johns Hopkins University; Obstetrician-in-Chief to the Johns Hopkins Hospital; Honorary President, Glasgow Gynecological and Obstetrical Society, 1910–12; President American Association for the Prevention of Infant Mortality, 1913–1914; President Medical and Chirurgical Faculty of Maryland, 1916; Corresponding Member of the Gynecological Societies of Leipzig and Munich. Honorary Fellow of Edinburgh Obstetrical Society, etc. *Council*, 1899. *Vice-President*, 1904. *President*, 1914. *Council*. 1128 Cathedral St., Baltimore, Md.

1886.—Wylie, W. Gill, M.D. Professor Emeritus of Gynecology, New York Polyclinic Medical School and Hospital; Consulting Gynecologist to Bellevue Hospital; Fellow of the Royal Medical Society, England. 28 West Fortieth Street, New York.

Total, 97 Active Fellows.

ACTIVE FELLOWS
CLASSIFIED

California

Kirkley, Cyrus A., 1244 Third Avenue, Los Angeles.
Lynch, Frank W., 2511 Broadway, San Francisco.
Newman, Henry Parker, 1560 Eighth Street, San Diego.
Wakefield, W. Francis, 1525 Sutter Street, San Francisco.

Canada

Chipman, Walter William, 285 Mountain Street, Montreal.
Goodall, James R., 27 Bishop Street, Montreal.
Little, Herbert M., 161 Stanley Street, Montreal.
Watson, Benjamin Philip, 14 Madison Avenue, Toronto.

Connecticut

Slemons, Josiah Morris, 284 Orange Street, New Haven.

District of Columbia

Bovée, J. Wesley, The Rochambeau, 815 Connecticut Avenue, Washington.
Miller, Gideon Brown, 1730 K Street, N. W., Washington.
Stone, Isaac S., Connecticut Avenue and L Street, N. W., Washington.

Georgia

Noble, George Henry, 980 Peachtree Street, Atlanta.

Illinois

Andrews, Frank T., 448 Barry Avenue, Chicago.
Byford, Henry T., Michigan Avenue and Adams Street, Chicago.
Curtis, Arthur H., 76 East Monroe Street, Chicago.
Dudley, Emilius Clark, 122 South Michigan Avenue, Chicago.
Heaney, Noble Sproat, 122 South Michigan Avenue, Chicago.
Martin, Franklin H., 20 North Michigan Avenue, Chicago.
Watkins, Thomas J., 104 S. Michigan Boulevard, Chicago.
Webster, J. Clarence, 920 Monroe Building, 104 South Michigan Avenue, Chicago.

Kentucky

McMurtry, Lewis S., The Atherton, Louisville.

Louisiana

Clark, Samuel, 108 Baronne Street, New Orleans.
Miller, Charles Jefferson, 1638 Joseph Street, New Orleans.

MAINE

THOMPSON, JOHN F., 211 State Street, Portland.

MARYLAND

CULLEN, THOMAS S., 20 East Eager Street, Baltimore.
HUNNER, GUY L., 2305 St. Paul Street, Baltimore.
KELLY, HOWARD A., 1418 Eutaw Place, Baltimore.
NOBLE, CHARLES P., Easton.
WILLIAMS, J. WHITRIDGE, 1128 Cathedral Street, Baltimore.

MASSACHUSETTS

BURRAGE, WALTER L., 282 Newbury Street, Boston.
GRAVES, WILLIAM P., 244 Marlborough Street, Boston.
GREEN, CHARLES M., 78 Marlborough Street, Boston.
HUTCHINS, HENRY TALBOT, 130 Dudley Road, Newton Centre.
NEWELL, FRANKLIN SPILMAN, 443 Beacon Street, Boston.
REYNOLDS, EDWARDS, 321 Dartmouth Street, Boston.

MICHIGAN

BOISE, EUGENE, Grand Rapids.
MANTON, WALTER PORTER, 32 Adams Avenue, Detroit.
MORLEY, WILLIAM HORACE, Addison Hotel, Detroit.
PETERSON, REUBEN, Ann Arbor.
SCHENCK, BENJAMIN R., David Whitney Building, Detroit.
SMITH, RICHARD R., Grand Rapids.

MINNESOTA

ADAIR, FRED L., 2218 S. Colfax Avenue, Minneapolis.
LITZENBERG, JENNINGS C., 910 Donaldson Building, Minneapolis.

MISSOURI

CROSSEN, HARRY STURGEON, Metropolitan Building, St. Louis.
EHRENFEST, HUGO, 4333 McPherson Avenue, St. Louis.
GELLHORN, GEORGE, 715 Metropolitan Building, St. Louis.
TAUSSIG, FREDERICK JOSEPH, 713 Metropolitan Building, St. Louis.

NEBRASKA

FINDLEY, PALMER, 3602 Lincoln Boulevard, Omaha.

NEW JERSEY

HARRIS, PHILANDER A., 26 Church Street, Paterson.

NEW YORK

BAILEY, HAROLD C., 269 Lexington Avenue, New York.
BISSELL, DOUGAL, 219 West Seventy-ninth Street, New York.
BOLDT, HERMANN, J., 39 East Sixty-first Street, New York.
BRETTAUER, JOSEPH, 1063 Madison Avenue, New York.
BROUN, LE ROY, 148 West Seventy-seventh Street, New York.

Child, Charles Gardner, 163 East Seventy-first Street, New York.
Cleveland, Clement, 40 East Forty-first Street, New York.
Cragin, Edwin B., 10 West Fiftieth Street, New York.
Dickinson, Robert L., 168 Clinton Street, Brooklyn.
Edgar, James Clifton, 28 West Fifty-sixth Street, New York.
Frank, Robert Tilden, 983 Park Avenue, New York.
Goffe, J. Riddle, 171 West Seventy-first Street, New York.
Holden, Frederick C., 198 Lincoln Place, Brooklyn.
Jarman, George W., 54 West Seventy-sixth Street, New York.
Krug, Florian, 616 Madison Avenue, New York.
McLean, Malcolm, 29 East 126th Street, New York.
Polak, John Osborne, 287 Clinton Avenue, Brooklyn.
Polk, William M., 310 Fifth Avenue, New York.
Rawls, Reginald M., 350 West Eighty-eighth Street, New York.
Sampson, John A., 180 Washington Avenue, Albany.
Stone, William Stephen, 162 East Sixty-third Street, New York.
Studdiford, William Emery, 124 East Thirty-sixth Street, New York.
Taylor, Howard C., 32 West Fiftieth Street, New York.
Vineberg, Hiram N., 751 Madison Avenue, New York.
Ward, George Gray, Jr., 71 West Fiftieth Street, New York.
Wells, Brooks H., 523 Madison Avenue, New York.
Wylie, W. Gill, 28 West Fortieth Street, New York.

Ohio

Reed, Charles A. L., "The Groton, Cincinnati.

Pennsylvania

Anspach, Brooke M., 1827 Spruce Street, Philadelphia.
Ashton, William Easterly, 2011 Walnut Street, Philadelphia.
Baldy, J. Montgomery, 2219 De Lancey Place, Philadelphia.
Chalfant, Sidney A., 5713 Rippey Street, Pittsburgh.
Clark, John G., 2017 Walnut Street, Philadelphia.
Davis, Edward P., 250 South Twenty-first Street, Philadelphia.
Foulkrod, Collin, 4005 Chestnut Street, Philadelphia.
Hirst, Barton Cooke, 1821 Spruce Street, Philadelphia.
Huggins, Raleigh R., 1018 Westinghouse Building, Pittsburgh.
McGlinn, John A., 113 South Twentieth Street, Philadelphia.
Montgomery Edward E., 1426 Spruce Street, Philadelphia.
Nicholson, William R., 1731 Pine Street, Philadelphia.
Norris, Charles C., 1503 Locust Street, Philadelphia.
Norris, Richard C., 500 North Twentieth Street, Philadelphia.
Schumann, Edward A., 1823 Chestnut Street, Philadelphia.
Simpson, Frank Farrow, 7048 Jenkins Arcade Building, Pittsburgh.
Werder, Xavier O., Jenkins Arcade Building, Pittsburgh.

Virginia

Harrison, George Tucker, University of Virginia.

ACTIVE FELLOWS

DECEASED

† Made Honorary Fellow.

Elected		Died
Founder.	ATLEE, WASHINGTON L., M.D.	1877
1882.	†BAKER, WILLIAM H., M.D.	1915
Founder.	BARKER, FORDYCE, M.D., LL.D.	1891
Founder.	†BATTEY, ROBERT, M.D.	1894
1913.	BRICKNER, SAMUEL M., A.M., M.D.	1916
Founder.	BUCKINGHAM, CHARLES E., M.D.	1877
Founder.	†BUSEY, SAMUEL C., M.D., LL.D.	1901
Founder.	BYFORD, WILLIAM H., M.D., LL.D.	1890
Founder.	BYRNE, JOHN, M.D., M.R.C.S.E.	1902
Founder.	†CAMPBELL, HENRY F., M.D.	1891
Founder.	†CHADWICK, JAMES R., A.M., M.D.	1905
1888.	COLEMAN, JOHN SCOTT, M.D.	1892
Founder.	DRYSDALE, THOMAS M., A.M., M.D.	1904
1889.	DUDLEY, A. PALMER, M.D.	1905
1891.	EDEBOHLS, GEORGE M., A.M., M.D.	1908
Founder.	ENGELMANN, GEORGE J., A.M., M.D.	1903
1890.	ETHERIDGE, JAMES H., A.M., M.D.	1899
1902.	FREDERICK, CARLTON C., B.S., M.D.	1911
1909.	GARCEAU, EDGAR, M.D.	1913
Founder.	GOODELL, WILLIAM, A.M., M.D., LL.D.	1895
1887.	HANKS, HORACE TRACY, M.D., LL.D.	1900
1894.	HENROTIN, FERNAND, M.D.	1906
1892.	HOLMES, HORATIO R., M.D.	1896
Founder.	†HOWARD, WILLIAM T., M.D.	1907
1885.	HUNTER, JAMES B., M.D.	1889
1877.	JACKSON, A. REEVES, A.M., M.D.	1892
1889.	JAGGARD, W. W., M.D.	1896
1886.	†JANVRIN, JOSEPH E., M.D.	1912
Founder.	JENKS, EDWARD W., M.D., LL.D.	1903
1885.	JEWETT, CHARLES, A.M., M.D., Sc.D.	1911
1886.	JOHNSTONE, ARTHUR W., A.M., M.D.	1905
1892.	KEATING, JOHN M., M.D., LL.D.	1893
1886.	KING, ALBERT F. A., A.M., M.D., LL.D.	1915
1888.	KOLLOCK, CORNELIUS, A.M., M.D.	1897

Elected		Died
1881.	LEE, CHARLES C., A.M., M.D., LL.D.	1893
Founder.	LUSK, WILLIAM T., A.M., M.D., LL.D.	1897
1892.	MacMONAGLE, BEVERLY, M.D.	1912
1891.	MOSELY, WILLIAM E., M.D., F.A.C.S.	1916
Founder.	MUNDÉ, PAUL F., M.D., LL.D.	1902
1890.	MURRAY, ROBERT A., M.D.	1909
Founder.	†NOEGGERATH, EMIL, M.D.	1895
Founder.	PARVIN, THEOPHILUS, M.D., LL.D.	1898
Founder.	PEASLEY, E. RANDOLPH, M.D., LL.D.	1880
1892.	PRYOR, WILLIAM R., M.D.	1904
1877.	†REAMY, THADDEUS A., M.D., LL.D.	1909
Founder.	SIMS, J. MARION, M.D., LL.D.	1883
Founder.	SKENE, ALEXANDER J. C., M.D.	1900
Founder.	SMITH, ALBERT H., M.D.	1886
Founder.	†STORER, D. HUMPHREYS, M.D.	1903
1891.	STRONG, CHARLES P., A.B., M.D.	1893
1879.	†SUTTON, R. STANSBURY, M.D., LL.D.	1906
Founder.	†TAYLOR, ISAAC E., M.D.	1890
Founder.	†THOMAS, T. GAILLARD, M.D.	1903
Founder.	TRASK, JAMES D., M.D.	1883
Founder.	†Van de WARKER, ELY, M.D.	1911
1891.	WATHEN, WILLIAM H., M.D.	1913
Founder.	WALLACE, ELLERSLIE, M.D.	1885
Founder.	WHITE, JAMES P., M.D.	1881
1887.	WILSON, ELWOOD, M.D.	1889
Founder.	WILSON, HENRY P. C., M.D	1898

ACTIVE FELLOWS

RESIGNED

Elected		Resigned
Founder.	BIXBY, GEORGE H., M.D.	1889
1878.	BOZEMAN, NATHAN, M.D.	1886
1894.	BUCKMASTER, A. HARPER, M.D.	1908
1893.	CUSHING, ERNEST W., A.B., LL.D., M.D.	1916
1895.	EMMET, JOHN DUNCAN, M.D.	1909
1881.	FOSTER, FRANK P., M.D.	1895
1881.	GILLETTE, WALTER R., M.D.	1889
1877.	GOODMAN, JOHN, M.D.	1892
1890.	*GRANDIN, EGBERT H., M.D.	1913
1891.	*HARDEN, VIRGIL O., M.D.	1894
Founder.	INGHAM, JAMES V., M.D.	1889
Founder.	LYMAN, GEORGE H., M.D.	1885
1891.	MacLAREN, ARCHIBALD, M.D.	1903
1895.	PENROSE, CHARLES B., A.M., P.H.B., M.D.	1912
Founder.	PENROSE, RICHARD A. F., M.D., LL.D.	1886
1877.	REYNOLDS, JOHN P., M.D.	1896
1892.	RICHIE, PARK, M.D.	1894
1881.	*SAWYER, EDWARD W., A.M., M.D.	1896
1879.	SCOTT, JOHN, M.D., F.R.C.S.I.	1886
1886.	*SIMS, H. MARION, M.D.	1901
Founder.	SIMS, J. MARION, M.D., LL.D.	1883
Founder	SINCLAIR, ALEXANDER D., M.D.	1882
1892.	SMITH, A. LAPTHORN, M.D., M.R.C.S.	1912
1891.	*TUTTLE, GEORGE M., A.B., M.D.	1896

* Due to requirements of Constitution and By-Laws.

MINUTES OF THE PROCEEDINGS

AT THE

FORTY-FIRST ANNUAL MEETING

OF THE

AMERICAN GYNECOLOGICAL SOCIETY

HELD AT

WASHINGTON, D. C.

MAY 9, 10 AND 11, 1916

FORTY-FIRST ANNUAL MEETING

WASHINGTON, D. C., MAY 9, 10 and 11, 1916

The following members were present:

ADAIR, FRED L.
ANSPACH, BROOKE M.
ASHTON, WILLIAM E.
BALDY, J. MONTGOMERY
BOISE, EUGENE
BOLDT, HERMAN J.
BOVÉE, J. WESLEY
BRETTAUER, JOSEPH
BROUN, LE ROY
CHALFONT, SIDNEY A.
CHILD, CHARLES G., JR.
CHIPMAN, WALTER W.
CLARK, JOHN G.
CLEVELAND, CLEMENT
CROSSEN, HARRY S.
CULLEN, THOMAS S.
CURTIS, ARTHUR H.
DAVIS, EDWARD P.
DICKINSON, ROBERT L.
EDGAR, J. CLIFTON
EHRENFEST, HUGO
FINDLEY, PALMER
FOULKROD, COLLIN
GELLHORN, GEORGE
GOFFE, J. RIDDLE
GREEN, CHARLES M.
HARRIS, PHILANDER A.
HARRISON, GEORGE TUCKER
HEANEY, NOBLE SPROAT
HIRST, BARTON COOKE
HUGGINS, RALEIGH R.
INGALLS, PHINEAS H.
KELLY, HOWARD A.
MCGLINN, JOHN A.
MCLEAN, MALCOLM
MANTON, WALTER P.
MARTIN, FRANKLIN H.
MILLER, GIDEON BROWN
MONTGOMERY, EDWARD E.
MORLEY, WILLIAM H.
NOBLE, CHARLES P.
NOBLE, GEORGE H.
NORRIS, CHARLES C.
NORRIS, RICHARD C.
PETERSON, REUBEN
POLAK, JOHN OSBORNE
POLK, WILLIAM M.
RAWLS, REGINALD M.
REYNOLDS, EDWARD
SAMPSON, JOHN A.
SCHUMANN, EDWARD A.
SIMPSON, FRANK FARROW
SLEMONS, JOSIAH M.
SMITH, RICHARD R.
STONE, ISAAC S.
STONE, WILLIAM S.
TAUSSIG, FREDERICK J.
TAYLOR, HOWARD C.
THOMPSON, JOHN F.
WAKEFIELD, W. FRANCIS B.
WARD, GEORGE GRAY, JR.
WATKINS, THOMAS J.
WELLS, BROOKS H.
WILLIAMS, J. WHITRIDGE

The Honorary Fellows present were as follows:

COE, HENRY C.
DAVENPORT, FRANCIS H.
FORD, WILLIS E.
GORDON, SETH CHASE

FIRST DAY, *Tuesday, May* 9, 1916

Morning Session.—The Society met at the Hotel Shoreham, and was called to order at 10.00 A.M., by the President, Dr. J. Wesley Bovée, Washington, D. C.

The Secretary called the roll.

On motion of the Secretary, the following were made members by invitation and urged to take part in the discussion: Drs. Robert M. Green, Boston; Austin Flint, New York; R. H. Wadman, Medical Corps, United States Army; J. R. Miller, Hartford, Connecticut; Dr. Williams, Philadelphia; Dr. Sullivan, Washington; Dr. H. C. Kirby, New Bedford, Massachusetts; W. W. McAllister, and J. Allen McClay, Paterson, New Jersey; Henry Schmitz, Chicago; John Wesley Long, Greensboro, North Carolina; C. P. Leonard, Baltimore, Maryland; Mr. Curtis E. Lakeman, Secretary of the American Society for the Control of Cancer; Elizabeth Hurdman, Baltimore, Maryland; Charles A. L. Reed, Cincinnati, Ohio; Dr. Lewis S. McMurtry, Louisville, Kentucky; Dr. John F. Moran, Washington, D. C.

THE PRESIDENT.—We will now have the pleasure of listening to an address of welcome by one of our co-workers in another branch of the science of medicine. His work is known to all of us and very approvingly. Just now he is a semi-gynecologist and obstetrician, being President of the Columbia Hospital for Women of this City—Dr. Wiley.

ADDRESS OF WELCOME BY DR. HARVEY W. WILEY

Mr. President and Members of the American Gynecological Society: Usually, in visiting a city for scientific or other purposes, an association is welcomed by an official of the city. Washington among cities is something like the country man said about the giraffe the first time he saw it at the zoo—"There ain't no such animal." And Washington ain't no city. We have no government of our own. We have no voice as citizens of the District in reference to selecting those who shall rule us. We have nothing to say how much we shall be taxed, and least of all, how that money shall be expended. So as a city we are, you may say, voiceless. I cannot offer you the hospitality of the city nor the keys thereof, as is customary, but I can only say

as a citizen of the District of Columbia and as one who is interested in medical matters in the District, and especially as President of the Columbia Hospital for Women, that I welcome you so far as my official duties and dignities will permit to this city. All of the authorities connected with the hospital will be very glad, not only the medical staff, but the executive staff, to have you visit this hospital. It is a new hospital just finished. It has only been occupied for two months. It was built by the United States of America. It is the one hospital in this city specifically and especially for women, and hence one in which, more than any other hospital in this city, we are particularly interested. It is not large as compared with many hospitals in this country, but we do think as a unit it is practically complete, and that it has embodied in its present equipment the most advanced ideas which are acknowledged and accepted by the profession in all matters which refer to obstetrics and gynecological diseases in general. This hospital is easy of access, and any hour that will suit you to come individually or collectively will be convenient to the hospital authorities. We should like to have you visit the hospital as a body, and I am sure that would be agreeable to the authorities.

I cannot say much in the way of professional matters to a body of eminent physicians such as I address at the present time. I have only been doing what little I can to furnish you employment in a moderate way, and I appreciate the skill which you have acquired and the ability which you possess in caring for the women of the country. I sometimes cannot help looking back to my early days when I was a student of Greek, and I wondered why the term "gynecology" had been selected to specify and designate your profession. There is nothing in the etymology of the word which would exclude medical service, nor is there anything in the etymology of the word which would include it. If we go to the other side we would have the science of andrology. If you used the word andrology you would not think a man was a specialist in diseases of men any more than if you look at the word gynecology from a language point of view, you would not have any inclination to say that this was a body of men whose special duties are the diseases of women. If you take the two sexes together we have the word anthropology which does not imply nor recall to the mind any idea of medical service, still the word gynecology by usage has come to

mean a special service which is rendered to diseases of women. It is not part of my duty to complain because you are misbranded, but having served for a considerable time in connection with the Pure Food and Drugs Department of our Government, I have become mighty keen on the branding of products, and I hate to see a good product like yourselves misbranded. I am not here to propose any other name for your specialty, mind you, but I am only calling your attention to the peculiarities as a Greek scholar of this name, and the difficulties that it presents.

At the time your Secretary was calling the roll I glanced over this program of yours, and I am astonished to see how full and how extensive it is. Surely, if in the three days you are to hold sessions you can digest this program, your stomachs ought to be preserved if you should ever die. I refer particularly to your mental stomachs, and I fancy that you have more on this program than you can really digest in three days. I see that you begin with syphilis and end with painless childbirth, so, it seems to me, you about cover the whole realm of activity.

We hope, gentlemen, that your visit here will continue to be one of pleasure, and we hope that you will have the type of weather for which Washington is famous, never very warm, never very cold, never very windy, never very calm. That is typical of Washington weather, and as you only have three days with us we hope that this is only an index of what the other days may be. You see Washington in its glory.

We are just on the threshold of international complications, and they do not seem to come to a head. We are on the threshold of the greatest events in the history of the world, it seems to me, that have ever been prognosticated, to use a medical term. No one can tell the magnitude of the changes which may take place within the next twelve months. We are also beginning to feel that the achievements which have been made in medicine in all of its branches are only a part of still greater achievements which the future holds out to us. The passage of medicine from purely experimental medicine to almost purely scientific medicine is just in progress. When I was a medical student, for the first time the idea of septics and antiseptics and germicides and things like that were coming into view. We were told it was advisable in the case of a surgical operation to spray the room with carbolic acid before we began. We were not told to sterilize the instruments, but it was deemed advisable to fill the

room with a carbolic acid spray. It was the beginning of the work of Lord Lister, and now we have come to understand how and why this process of immunity is to be conducted. It was a common thing when I was born, that is, several years ago, to have puerperal fever in the community carried by the obstetrician or the family doctor from one family to another. Now, these cases are extremely rare. So you see, we have made immense progress. However, there is much yet to be done; there is much yet to be accomplished.

If we compare medicine with surgery, we find that surgery is far more an exact science than any kind of internal medicine, and yet the surgeon of today has not reached the limit of his skill. Operations will perhaps never be any different nor any better performed than they are today; but improvements in methods and technic will be brought about.

In our hospital the other day I spoke to a physician I had seen several times of late. I saw him yesterday and said to him, "What are you doing here?" He replied, "I am building a new bladder for a woman." Now, building a new bladder is something we never heard of in surgery a few years ago. When so many great and wonderful things are being done in the surgical world it would be unsafe for us to predict that we have reached anything like perfection in that field. The same is true with reference to gynecology which is largely a branch of surgery or of internal medicine, and one that has not yet reached practically the limit of its accomplishments. The progressive physician is the man who realizes how much there is yet to do and to discover, and it is he who is spurred on to renewed efforts to go further into the unknown than anyone has reached before. There is no such thing as the pole in medicine; there is no place to which you can go and say, "Thus far and no farther." That can be said of the man who reaches the pole; there is no more discovery in that direction. But there is no pole in medicine; there is no point of which we can say, "No farther can we go." That is the glory of medicine; it still offers new fields of progress and no one thinks of stasis. That is especially true of the branch of the profession in which you are engaged. We men think we rule the world. I used to think that too, as a man, but five years ago something happened in my life which has led me to an entirely different opinion about ruling the world. When I was married I decided I would have no dispute

with my wife about affairs in the household. A friend of mine said, "How did you manage it?" Well, I said, when we began housekeeping we agreed that all minor matters should be determined by the housewife and all major matters should be determined and decided by the husband. My friend said, "How did it work out?" Well, I replied, it has worked well up to this point, in that we have not had any major matter to consider whatever.

We all know, in the first place, that women are tougher than men. They live longer; they can endure more. Not only have they to endure all the hardships peculiar to women, but they have to endure the men besides; hence, their average life is longer than that of man, in spite of all the troubles to which they are subject and from which men are free.

Byron was a great gynecologist, and Kipling has made a good claim to be a gynecologist when he said the female species dominated the male, and as I study the lower forms of life I find the female is the dominant factor. The female mosquito is the one that does the biting. The male mosquito stays home with the children. It is only when we come to the homosapiens and bodies of that class that the male begins to assert himself as a dominant factor. Moreover, the welfare of this country, the prosperity of this country, the vitality of this country depends largely upon the mothers of this country, and that branch of science which has to do with the mothers of the country is that branch of medical science which is the nearest approach to the fundamentals in the welfare and prosperity and vitality of the country. So I congratulate you, gentlemen, on being devoted to that branch of medicine which lies nearest to all that is dear and hopeful, not only for the present, but for the future, and I bespeak for you continual progress and a future of acquisition and science, in order that the great science which you represent may come more and more into its own as being the medical science of the nation. (Applause.)

Response to the Address of Welcome by Dr. Edward P. Davis, Philadelfhia

Dr. Wiley, Mr. President and Members: It is not often that this Society is favored with the presence of a distinguished scientist in another branch of medicine than our own, and

therefore it has been with special pleasure that we have listened to Dr. Wiley's address of welcome.

Dr. Wiley's welcome is characteristic of the finest type of American work and of research, and one of his peculiarities is exemplified in an anecdote told which is a pure specimen of American humor.

There was an old woman who had never seen a fast railroad train in active motion, and one day she was taken to a small station where an express runs by, and some one said, "Auntie, that train did'nt stop." "Stop," she said, "it did'nt even hesitate." Dr. Wiley has never hesitated in his work for the good of the American public and for humanity. He says modestly that he is not now an official. That is one way of saying that he is not at the front. Recently, there was an old lady walking along in one of the warring countries, and she saw a stalwart young chap sitting on a stool milking a cow, and she said, "Young man, why are'nt you at the front?" He replied, "Because the milk comes from this end." No matter where the milk came from, Dr. Wiley has always stood for purity of products, regardless of influences political or otherwise. We honor him as an American who has stood for the benefit of the nation and for humanity.

We come to Washington with feelings of peculiar pleasure. First, we meet our Washington brothers. Again, Washington is now clad in its best clothes, always charming, but now especially so. Furthermore, there is a very considerable amount of scientific information or misinformation to be digested here, but, gentlemen, I take it, that at this crisis of the world no American can enter the capitol of this country without emotion. Here are some of our landmarks; here the records of our history. Our capitol yields to none in this world in duty, in dignity and simplicity, which is a true interpretation of all beauty.

There are great monuments throughout the world—the memorial church of Alexandria; the monuments of Lincoln, and of Rush in Bedford Rock; the Bismarck statue in Berlin; the Arch of Triumph in Paris; and the Nelson column in London, but I take it, the Washington Monument in dignity and importance is second to none. It stands forth square without ornament or support, pointing eternally to the light, and I cannot but believe, and I will not cease to hope, that in this time of a world's crisis, through God's Providence, this land will be a

centre of crystallization around which shall gather those elements which shall bring forth a lasting peace.

The first order of business in the scientific session was a symposium on "Syphilis in Its Relation to Obstetrical and Gynecological Practice."

Papers were read as follows:

1. "Syphilis in its Relation to Obstetrics," by Dr. Edward P. Davis, Philadelphia, Pennsylvania.

2. "Syphilis in its Relation to Some Social Problems," by Dr. Sigmund Pollitzer, New York (by invitation).

3. "Syphilis of the Internal Genitalia in the Female," by by Dr. George Gellhorn and Dr. Hugo Ehrenfest, St. Louis, Mo.

4. "The Frequency of Syphilis in Obstetric Practice," by Dr. J. Whitridge Williams, Baltimore, Maryland.

5. "The Specificity of the Wassermann Reaction," by Dr. Rudolph Buhman, St. Louis, Missouri (by invitation).

6. "Observations on the Occurrence of Syphilis in the University of Michigan Obstetrical and Gynecological Clinic," by Dr. Reuben Peterson, Ann Arbor, Michigan.

7. "Some Remarks on the Relationship of Syphilis to Miscarriage and Fetal Abnormalities," by Dr. Fred L. Adair, Minneapolis, Minnesota.

8. "Demonstration of Placental and Fetal Syphilis," by Dr. E. D. Plass (by invitation), Baltimore, Maryland.

This symposium was discussed by Dr. Williams, after which, on motion of Dr. Brettauer, the Society adjourned until 9.00 A.M., Wednesday.

SECOND DAY.—*Wednesday, May* 10, 1916

Morning Session.—The Society met at 9.00 A.M., and was called to order by the President.

9. "How Closely do the Wassermann Reaction and the Placental Histology Agree in the Diagnosis of Syphilis?" by Dr. J. Morris Slemons, New Haven, Connecticut.

10. "Syphilis of the Uterus," by Dr. Charles C. Norris, Philadelphia, Pennsylvania.

11. "Experimental Syphilis," by Dr. Frederick W. Baeslack, Detroit, Michigan (by invitation).

12. "Syphilitic Fever," by Dr. Frederick J. Taussig, St. Louis, Missouri.

The discussion of the Symposium on Syphilis was continued by Drs. Anspach, Foulkrod, Adair, Slemons, Taussig, Ehrenfest, and the discussion closed by Dr. Gellhorn.

At this juncture the First Vice-President, Dr. Robert L. Dickinson, Brooklyn, took the Chair, and President Bovée delivered his address.

At the conclusion of the address, on motion of Dr. J. Riddle Goffe, a rising vote of thanks was extended to President Bovée for his admirable and charming review of the contributions to the Society and to the science of medicine and surgery.

13. "The Variations of the Blood Supply of the Ovary and Their Possible Operative Importance," by Dr. John A. Sampson, Albany, New York.

This paper was discussed by Drs. Dickinson, Ehrenfest, Polk, and in closing by the essayist.

14. "Incontinence of Urine in Women," by Dr. Howard C. Taylor, New York City.

Discussed by Drs. Taussig, Harris, Boldt, Watkins, Dickinson, Noble (George H.), Miller, and in closing by the author of the paper.

On motion the Society adjourned until 8.15 P.M.

Business Meeting

At the Shoreham Hotel, Washington, D. C., on May 10, 1916, the Business Meeting was called to order at 5 P.M. by the President, Dr. J. Wesley Bovée.

The minutes of the preceding meeting were presented as published in the TRANSACTIONS, and with the correction of the statement that a letter had been received from Dr. Morley explaining his absence, which should have been Dr. Mosely, they were adopted as printed.

The Treasurer's report was presented, and after being audited by a committee appointed by the chairman and reported correct, it was received and placed on file.

The Council reported the death of Dr. William E. Mosely, February 10, and of Dr. Samuel M. Brickner on May 5, both of them Active Fellows. Also the death by accident of an Honorary Fellow, Sir Alexander R. Simpson, of Edinburgh.

It was reported that at the request of Dr. Phineas H. Ingalls, elected 1891, and Dr. Henry D. Fry, elected 1890, they were

transferred to the Honorary List, all provisions of the Constitution having been complied with.

The resignation of Dr. Ernest W. Cushing, elected 1893, and dated December, 1915, was presented, with the recommendation of the Council that Dr. Cushing's dues for 1915 be remitted and his resignation be accepted. On motion, duly seconded, the recommendation of the Council was endorsed.

Letters of regret at their forced absence from the meeting were presented from Drs. Newman, Schenck, Robb, and Krug, with the endorsement of the Council. On motion, duly seconded, these letters of explanation were received.

The report on the progress of the album was made as follows:

152 new photographs and revised autobiographies.

77 old photographs with many revised autobiographies.

It was stated that the old album contained 177 Fellows, against 234 that would appear in new issue when all was completed. In view of the fact that additional members would be nominated at this meeting, it was thought wise to take no further steps until after the annual meeting.

The report of the cost of the Referat pamphlets was made, stating that the amount, not including the typesetting, which was to be charged to the TRANSACTIONS, had been $92.89.

It was recommended by the Council that the cost of the Wednesday luncheon be paid from the treasury of the Society. On motion, duly seconded, this was ordered to be done.

The Council reported that the following men had been nominated for Active Fellowship in the Society:

Harold C. Bailey, New York.
Samuel M. D. Clark, New Orleans.
Frederick C. Holden, Brooklyn.
Guy L. Hunner, Baltimore.
Henry T. Hutchins, Boston.
Jennings C. Litzenberg, Minneapolis.
Frank W. Lynch, San Francisco.
Lewis S. McMurtry, Louisville.
C. Jefferson Miller, New Orleans.
William R. Nicholson, Philadelphia.
C. A. L. Reed, Cincinnati.
Xavier O. Werder, Pittsburgh.

On separate ballot each candidate recommended by the Council received the necessary two-thirds vote for his election.

It was declared by the President that all the candidates nominated by the Council had been elected Active Fellows.

The Council reported the subject "Organotherapy in Gynecological and Obstetrical Practice" as the one suggested for the discussion and Referat papers of the next annual meeting in 1917. On motion, duly made and seconded, the wording of this subject was changed to the following: "Relations of the Glands of Internal Secretion to Gynecology and Obstetrics." The nomination of Dr. Frank as chairman of the committee with power to form the committee and with instructions to issue the Referat pamphlet as done for this present meeting was endorsed.

The proposed amendment to the Constitution and By-laws as printed and submitted to the Society was then taken up. The Council proposed an amendment to this admendment to read as follows:

Article V of the proposed amendment to the Constitution to remain as printed.

Section V of the proposed amendment to the By-laws to read as follows: "*Nomination and election of officers.* Nominations of officers should be made by a committee consisting of the five ex-Presidents who have last served as Presidents and of three Active Fellows appointed by the President on the morning of the first day of the meeting. The ex-Presidents shall report their presence on the morning of the first day to the Secretary.

"This committee shall meet on the first day of the annual meeting and shall nominate candidates for the various elective offices.

"The nominations shall be reported and posted on or before the morning of the second day of the meeting.

"Any member of the Society shall have the privilege of nominating candidates at the business meeting of the Society.

"Fellows nominated as officers shall be elected by ballot."

After considerable discussion it was proposed that the clause "in case of a tie vote in the nominating committee for officers, the acting President of the Annual Meeting shall be empowered to cast the deciding vote" be added to this amendment. On motion this was adopted.

The amendment to the proposed amendment with this addi-

tion was then submitted to the Society, and on motion, duly seconded, it was accepted. The amendment to the Constitution and By-laws as adopted will read as follows:

Amendment to the Constitution

Article V of the Constitution, paragraph 2, to be omitted and in its place is to be substituted, "All officers shall be nominated and elected in accordance with the By-laws."

Amendment to the By-laws

Section V. *Nominations and Election of Officers.* Nominations for officers shall be made by a committee consisting of the five ex-Presidents who have last served as Presidents and of three Active Fellows appointed by the President on the morning of the first day of the meeting. The ex-Presidents shall report their presence on the morning of the first day to the Secretary.

This committee shall meet on the first day of the annual meeting and shall nominate candidates for the various elective offices.

In case of a tie vote in the nominating committee for officers the acting President of the annual meeting shall be empowered to cast the deciding vote.

The nominations shall be reported and posted on or before the morning of the second day of the meeting.

Any member of the Society shall have the privilege of nominating candidates at the business meeting of the Society.

The fellows nominated as officers shall be elected by ballot. (Section V of the present by-laws to read Section VI, etc.).

On motion it was resolved that the Secretary be instructed to send telegrams of greetings to the four Founders now living: Dr. Thomas Addis Emmet, Dr. Joseph Tabor Johnson, Dr. John C. Reeve, and Dr. William L. Richardson.

The nominations of officers being in order the following named Fellows were elected:

President—Dr. Frank Farrow Simpson, Pittsburgh.

1*st Vice-President*—Dr. Le Roy Broun, New York.

2*d Vice-President*—Dr. W. Francis B. Wakefield, San Francisco.

Secretary—Dr. George Gray Ward, Jr., New York.

Treasurer—Dr. Brooke M. Anspach, Philadelphia.

Members of the Council Elected for One Year—Dr. William H. Morley and Dr. Arthur H. Curtis.

Dr. J. Wesley Bovée, the retiring President, was elected to the Council for four years.

Other members of the Council are: Dr. Thomas J. Watkins, Dr. J. Whitridge Williams, Dr. Henry C. Coe.

On motion, duly seconded, it was resolved that Dr. Broun remain in charge of the album to be issued.

Dr. Palmer Findley gave notice of a proposed amendment to the Constitution establishing the position of Associated Fellow of the Society. Dr. Findley was instructed to amplify the recommendation of such a fellowship and to submit it to the Council at its next meeting and subsequently to the Society.

There being no further business the Society adjourned.

The Society reassembled at 8.30 P.M., and was called to order by the President.

Symposium on "Cancer of the Uterus; A Review of the Present Methods of Treatment."

15. "Pre-Cancerous Changes in the Uterus," by Dr. William S. Stone, New York City.

16. "The Clinical Course of Cancer in the Light of Cancer Research," by Dr. Harvey R. Gaylord, Director of the State Institute for the Study of Malignant Disease, Buffalo, New York (by invitation).

President Bovée, on behalf of the Society, thanked Dr. Gaylord for his very interesting remarks.

17. "Cancer of the Uterus and its Treatment," by Dr. John G. Clark, Philadelphia, Pennsylvania.

18. "The Extended Operation for Carcinoma of the Uterus," by Dr. Reuben Peterson, Ann Arbor, Michigan.

19. "Results in the Use of Radium in the Treatment of Carcinoma of the Uterus," by Dr. Howard A. Kelly, Baltimore, Maryland.

20. "The Heat Problem as a Method of Treatment in Cases of Inoperable Uterine Carcinoma," by Dr. James F. Percy, Galesburg, Illinois (by invitation).

21. "The Effect of Low Degrees of Heat Compared to High Degrees of Heat," by Dr. Herman J. Boldt, New York City.

22. "The Report of the Committee of the Society on the Development and Work of the American Society for the

Control of Cancer, Organized at the Previous Meeting in Washington," by Dr. Le Roy Broun, New York City.

The symposium on cancer was then discussed by Drs. Leonard, Gellhorn, Noble (Charles P.), Ward, Chipman, Schmitz, Boldt, Percy, Peterson, Clark, and in closing by Dr. Stone.

On motion the Society adjourned until 9.00 A.M., Thursday.

THIRD DAY.—*Thursday, May* 11, 1916

Morning Session.—The Society met at 9.00 A.M., and was called to order by the President.

23. "Abdominal Myomectomy and Hysteromyomectomy by Morcellation," by Dr. Charles G. Child, Jr., New York City.

Discussed by Drs. Goffe, Watkins, Simpson, and in closing by the essayist.

24. "A Study of the Pathology of Sterility with End-results following Treatment and Non-treatment," by Dr. John Osborne Polak, Brooklyn, New York.

Discussed by Drs. Dickinson, Noble (Charles P.), Manton, Child, Smith, and in closing by the essayist.

25. "Rupture of the Scar following Cesarean Section," by Dr. Palmer Findley, Omaha, Nebraska.

Discussed by Drs. Harrison, Green, Polak, Davis, Chipman, Miller, and in closing by the essayist.

26. "The Constitutional Factor in Gynecology and Obstetrics," by Dr. Charles P. Noble, Philadelphia, Pennsylvania.

Discussed by Drs. McCurdy and Smith.

27. "Immediate Complete Amputation of the Umbilical Cord," by Dr. Robert L. Dickinson, Brooklyn, New York.

Discussed by Dr. Polak.

28. "Tissue Tone as an Index to Vital Resistance, with Special Reference to Prolapse of the Uterus," by Dr. R. R. Huggins, Pittsburgh, Pennsylvania.

Discussed by Dr. Gellhorn.

29. "Painless Labor; Its Production by Other Means than that of the Morphin-Scopolamin Method.

Reports and discussion to be "Based on Case Records," by Dr. J. Clifton Edgar, New York City.

Discussed by Drs. Foulkrod, Polak, Manton, Dickinson, Wakefield, and discussion closed by Dr. Edgar.

The last paper having been read, President Bovée said: We have now reached the end of our program. It has been a busy one. The attendance has been large, the quality of the papers presented excellent, and the discussions interesting. You have been patient with your presiding officer and he appreciates it. The time has come for him to turn over the gavel to his successor who unfortunately cannot be here at this moment.

I wish to thank you for the consideration you have shown me very heartily. I appreciate my shortcomings, as well as the shortcomings of the Society in elevating me to this position of honor. You have been very patient, and things have gone along, not without trepidation on my part, with smoothness.

I think a motion of thanks to the hotel for its consideration of us and in taking care of us might be in order at this time. (Applause.)

Dr. Thomas J. Watkins: I desire to move that a vote of thanks be extended to Dr. Stone and his Committee, as well as to the hotel management for the splendid and able manner in which they have cared for us and in helping to make this one of the most successful meetings which we have ever had.

The motion was seconded by several and carried unanimously.

Dr. F. F. Simpson, the newly elected President, having arrived, President Bovée appointed Dr. Stone and Dr. Miller to escort him to the Chair.

Dr. Simpson, in accepting the Presidency, said: I wish to thank you, gentlemen, for the great honor which you have conferred upon me, and to congratulate you upon the splendid meeting that is just coming to a close. I believe all will agree that to the retiring officers we owe a debt of gratitude that we cannot repay, because this marks a new and high order in the transactions of this organization. There have been many epoch-making productions brought forth at this meeting, so that many chapters will have to be revised in the text-books that are issued in the future. The one feeling in my heart at the present time is a little dislike and also envy for my good friend, the retiring President, for the reason that he has set such a pace for the future. I thank you very much. (Applause.)

As there was no further business to come before the meeting, on motion the Society adjourned to meet in 1917.

Le Roy Broun, M.D.,
Secretary.

CONSTITUTION

I. This Society shall be known as the AMERICAN GYNECOLOGICAL SOCIETY.

II. The object of this Society shall be the promotion of knowledge in all that relates to the Diseases of Women, to Obstetrics, and to Abdominal Surgery.

FELLOWS

III. The Fellows of this Society shall consist of Fellows and Honorary Fellows.

The Fellows shall not exceed one hundred in number.

The Honorary Fellows shall not exceed ten American (exclusive of those who have been Active Fellows of the Society) and twenty-five foreign.

"Candidates for Active Fellowship shall be graduates of medicine of at least ten (10) years' standing and shall be proposed to the Council by two Fellows *only*, at least two months before the first day of the meeting, each nomination being accompanied by a list of the principal publications of the candidate and of the official positions which he holds. On nomination by the Council, each candidate shall be separately balloted for at the annual meeting. A two-thirds affirmative vote of all the Fellows present shall constitute an election, at least fifteen Fellows being present.

A list of all the candidates, accompanied by the names of their proposers, their official positions, and their principal publications, shall be sent to every Fellow with the notification of the annual meeting."

HONORARY FELLOWS

IV. The power of nominating Honorary Fellows shall be vested in the Council.

No Honorary Fellow shall be voted on at the same Annual Meeting at which his name is recommended by the Council; but at the next succeeding Annual Meeting, except in the case of active Fellows of the Society being transferred to the Honorary List.

The election shall take place in the same manner as that of ordinary Fellows.

They shall enjoy all the privileges of other Fellows, but shall not be required to pay any fee or be allowed to hold any office, or to cast any vote.

Any member of this Society at the end of twenty-five years' active service in the Society; or at any time thereafter, at his own request, shall be placed on the roll of Honorary Fellows, and shall be so classified in the next volume of TRANSACTIONS, provided the request be made during the fiscal year for which the annual dues have been paid by that member.

OFFICERS

V. The officers of the Society shall be a President, two Vice-Presidents, a Secretary, and a Treasurer, and two other Fellows, all to be elected annually, who, with four other Fellows, one to be elected each year for a term of four years, shall constitute the Council of the Society.

All officers shall be nominated and elected in accordance with the By-laws.

The officers shall enter upon their duties immediately before the adjournment of the meeting at which they were elected, and shall hold office for one year.

Any vacancy occurring between the annual meetings shall be filled temporarily by the action of the Council.

All officers shall be eligible for reëlection.

ANNUAL MEETING

VI. The annual meeting of the Society shall be held regularly at a date to be determined by the Council, and shall continue for three days, unless otherwise ordered by vote of the Society at any executive session. The sole management

of the annual meetings shall be under the control of the Council subject to any action of the Society at the preceding annual meeting.

AMENDMENTS

VII. This Constitution may be amended by a two-thirds vote of all the Fellows present at an annual meeting, provided that notice of the proposed amendment has been given in writing at the annual meeting next preceding, and that the same has been printed in the notification of the meeting at which the vote is to be taken.

BY-LAWS

PRESIDENT AND VICE-PRESIDENTS

I. The President and Vice-Presidents shall discharge the duties belonging to their respective offices. The President shall be *ex officio* chairman of the Council.

SECRETARY

II. The Secretary shall attend and keep a record of all the meetings of the Society and of the Council, of which latter he shall be *ex officio* clerk, and when not in session shall perform its business by correspondence.

At each annual meeting he shall announce the names of all who have ceased to be Fellows since the last report.

He shall superintend the publication of the TRANSACTIONS, under the direction of the Council.

He shall notify candidates of their election to Fellowship.

He shall send notifications of the annual meetings and of the meetings of the Council.

TREASURER

III. The Treasurer shall receive all moneys due and pay all debts. He shall render an account thereof at the annual meeting, when an Auditing Committee shall be appointed to report.

COUNCIL

IV. The Council shall meet as often as the interests of the Society may require.

Five members shall constitute a quorum.

It shall have the management of the affairs of the Society, subject to the action of the Society at its annual meetings.

It shall arrange the order for the reading of papers at the annual meetings.

It shall not have power to make the Society liable for any debts exceeding in total one hundred dollars in the course of any one year, unless specially authorized by a vote of the Society.

It shall have the entire control of the publications of the Society, with the power to reject such papers or discussions as it deems best.

The President, or any three members, may call a meeting, notice of which shall be transmitted to every member two weeks previous to the meeting.

The Council shall determine questions by vote, or—if demanded—by ballot, the President having a casting vote.

The Council shall constitute a Board of Trial for all offences against the Constitution and By-laws, or for conduct unbecoming an honorable physician, and shall have the sole power of moving the expulsion of any Fellow.

NOMINATION AND ELECTION OF OFFICERS

V. Nominations of officers shall be made by a committee consisting of the five ex-Presidents who have last served as Presidents and of three Active Fellows appointed by the President on the morning of the first day of the meeting. The ex-Presidents shall report their presence on the morning of the first day to the Secretary.

This committee shall meet on the first day of the Annual Meeting and shall nominate candidates for the various elective offices.

In case of a tie vote in the nominating committee for officers, the acting President of the anual meeting shall be empowered the cast the deciding vote.

The nominations shall be reported and posted on or before the morning of the second day of the meeting.

Any member of the Society shall have the privilege of nominating candidates at the business meeting of the Society.

The Fellows nominated as officers shall be elected by ballot.

ORDER OF BUSINESS

VI. The Order of Business at the annual meetings of the Society shall be as follows:

I. General meetings at 10 A.M. each day.
   1. Reports of the Committees.
   2. Reading of Papers and Discussion of the same.

II. The Business Meeting, at which only Fellows of the Society shall be present, shall be held on the second day of the session, at an hour determined by the Council and announced on the program of the meeting. The Secretary's Record shall then be read; the Treasurer's accounts be submitted; the reports of committees or other than scientific subjects be received; and all miscellaneous business be transacted.

PAPERS, ETC.

VII. The titles of all papers to be read at any annual meeting shall be forwarded to the Secretary not later than *two weeks* before the first day of the meeting.

No paper shall be read before the Society which has already been printed or has been read before another body.

All papers that may be read before the Society, and accepted for publication, shall become the property of the Society, and their publication shall be under the control of the Council. Such papers may be published in full in medical journals, provided that they are also printed in the TRANSACTIONS.

QUORUM

VIII. A quorum for business purposes shall be fifteen Fellows.

DECORUM

IX. No remarks reflecting upon the personal or professional character of any Fellow shall be in order at the annual meetings, except when introduced by the Council.

ASSESSMENTS

X. Every Fellow shall pay in advance the sum of twenty dollars annually.

Any Fellow whose subscription shall be more than nine months in arrears shall be reminded of the fact by the Treasurer in writing; in event of payment not being then made, he may, on vote of the Council, be dropped from the Society.

Each Fellow shall pay on admission an initiation fee of twenty-five dollars.

ATTENDANCE

XI. Any Fellow who shall neither attend nor present a paper for three successive years shall, unless he offers an excuse satisfactory to the Society, be dropped from Fellowship.

AMENDMENTS

XII. Any of these By-laws may be amended, repealed, or suspended by a two-thirds vote of the Fellows present at any meeting. *Provided,* Previous notice in writing has been given at the annual meeting immediately preceding the one at which the vote is to be taken.

ADDRESS OF THE PRESIDENT

NOTES ON THE PAST, PRESENT AND FUTURE OF GYNECOLOGY, OBSTETRICS AND ABDOMINAL SURGERY

By J. Wesley Bovée, M.D.
Washington, D. C.

Your organization, now holding its forty-first annual meeting, is the parent American body of the part of medicine represented by gynecology, obstetrics and abdominal surgery. As a national gynecological organization, it is the pioneer of the world. Composed as it is of the men most famous in America in these spheres of endeavor for the benefit of the human race its prestige is unquestioned. To be the chosen President of it should be the laudable ambition of every earnest and scientific American worker in the specialties mentioned. It is, therefore, with no little pleasure and pride that I sincerely acknowledge the signal honor you conferred on me last year by elevating me to this important position. It is not always brilliancy that appeals to the hearts of one's confrères, as one is bound to observe in this selection. Having been for many years at least a consistent worker in and for this Society, I am prompted to believe the selection was due alone to that reason. My pride, surely, is pardonable when we recall the names of my

very illustrious predecessors. Certainly, the names of J. Marion Sims, T. G. Thomas, T. A. Emmet, Barker, Goodell, Peaslee, Baldy, Davis, Williams, Kelly and of many others who are or have been Fellows in this Society will stand until the end of time as great medical geniuses. Nor can I allow this opportunity to pass to pay a tribute to the parents of this Society, Chadwick, Mundé, and J. Tabor Johnson, all of whom have been its presidents. Though death prevents our extending the hand of fellowship to the first two, the last remains to us in sterling physical and mental integrity. Last year, on the occasion of his transfer to honorary fellowship, the Society signalized its affection for him and appreciation for his services to it by sending him a very handsome tribute in the form of a well-prepared letter, signed by each Fellow in attendance. I venture to state that letter will be treasured through life by this modest and much honored man.

In a study of the history of gynecology in America one is thrilled with pride by the remarkable strength of character portrayed by the early workers. McDowell, Nathan Smith, Peaslee, the Atlees, Dunlap and others passed triumphantly through the fiery furnace of scorn, hatred, and slander of communities—and even of their professional colleagues, in their efforts to create a legitimate position in medicine for the surgical removal of large ovarian tumors. In Reeves's memorial of Dunlap (*Trans. Am. Gynec. Soc.*, 1894, xiv, 359) he mentions the rebuffs the latter received from surgeons and even his college professor. Dunlap states, regarding his first operation: "With a great deal of labor and care I prepared a report of the case for a Cincinnati medical journal, the editor of which was my old professor of materia medica in the Cincinnati Medical College, Dr. John B. Harrison. The editor returned the manuscript with a note explaining that his reason for not publishing it was that it would encourage an unjustifiable and murderous operation

which had already been tried and condemned by the profession, both in this country and Europe." Another rebuff was from a "noted surgeon" who told him, "You ought not to be doing such things." The Atlees in Philadelphia, were condemned as murderers and butchers for doing ovariotomy, and not a surgeon in New York would defend this operation when Peaslee read his paper before the New York Academy of Medicine in 1864. Kimball, of Lowell, Massachusetts (1855), and others were struggling similarly to secure recognition for the surgical removal of large uterine fibroids by the abdominal route.

The work and ingenuity of Sims in the treatment of vesicovaginal fistulæ will ever serve as a stimulus for the disheartened struggling against formidable agencies in various and devious avenues of study of the mysteries of the living human body and the amelioration of its ailments. The work of his faithful pupil, Bozeman, in this sphere cannot but arouse admiration. Even Sims was not entirely uninfluenced by besetting disappointments and surgical failures, for he was known to have become so disheartened in his work in the South, that he sold his property and arranged to embark elsewhere upon a business career. Had not the New York clothing merchant, not violated their contract at this juncture, most ikely medicine would have been deprived of the aid of this wonderful man and the human family of the benefit of his medical researches. His prodigious mentality and great activity were again appropriated by our profession as by a Providential intercession. Just why the master mind and hand of such a man cannot be spared to benefit mankind indefinitely is one of the unexplained mysteries of nature.

The plastic work of the eldest Emmet and the great work of Thomas, Polk, and Fordyce Barker will always be appreciated. The plastic perineal surgery of J. Collins Warren, the round ligament operations for the rectification

of posterior uterine displacements, associated with the names of Dudley, Mann, Wylie, Simpson, G. H. Noble, Andrews and others remain familiar to us all. Not to refer to Hodge, Parvin, Meigs, and Oliver Wendell Holmes were to slight obstetrics with its other great geniuses.

We must recall with American pride the impetus to urinary surgery given by Kelly, who popularized direct cystoscopy and ureteral and renal exploration by its aid, as well as the advanced work of several Americans in the scientific treatment of urinary diseases. The work of Goffe and Baer invoked a great advance in the surgical treatment of uterine fibromata. C. P. Noble by his careful and laborious study into the complications and degenerations of these neoplasms rendered an invaluable service. I have not mentioned these great men as comprising all the talent in obstetrics and gynecology, for surely later years have not stinted us, in furnishing us with wonderful skill working with precise methods and securing definite and undeniable results, but rather honoring myself by claiming a certain relationship with those great men. Boasting of the accomplishments of our professional progenitors and fellow-workers may be pardonable.

Of the splendid work of the past, gynecology has not neglected the great subject of cancer. This disease as it affects women is almost limited to their reproductive organs. The uterus is the organ most commonly invaded by it. Probably Wrisberg and Montaggia were the first to recommend total hysterectomy for its eradication. Marshall, in 1873, and Langenbeck, in 1813, were the first to perform this operation, though in their cases the uterus protruded from each patient. In 1814 Gutberlet recommended hysterectomy by a special suprapubic method. In 1822 Sauter, of Constance, first performed vaginal hysterectomy for cancer of the uterus *in situ*. Recamier, in 1829, recommended a special plan of vaginal hysterectomy, and the

following year Delpech proposed a combined abdominal and vaginal procedure. To the lover of medical history it is interesting to read the comments upon these operations made by medical writers during the next few years. Blundell, whose small book, *Observations on Some of the More Important Diseases of Women*, appearing in 1837, is particularly interesting. Little progress was made until January 30, 1878, when Freund began performing his radical abdominal operation after cauterizing the cervix or even amputating it when large. I cannot but yield to my sense of justice in passing and mention here that Freund employed as an essential feature of his procedure, in 1878, the very position so well described in 1891 by Trendelenburg, and that has since borne his name. It remained for our American gynecologist, Emil Ries, of Chicago, to plan and recommend a very radical operation for cancer of the cervix, which he succeeded in having performed in 1895 by the late Wertheim. Ries has been an indefatigable investigator of this affection, and deserves great credit. Nor can we leave this subject without alluding to the inestimable original work in this affection that was done by John G. Clark and X. O. Werder at about the same time that Ries and Wertheim were beginning their work in Berlin. The galvanocautery as employed by John Byrne, Skene and many others following their advocacy of it, has been remarkably efficacious.

Of obstetrics one must speak with considerable reserve. The untrained obstetrician has been the weak spot in our preparedness. The famous teachers Parvin, Barker and others did not to a desirable extent impress our profession with the importance of this specialty. This, no doubt, was in part due to its being a heritage from the midwife, who has striven to claim it as a possession. In later years an earnest effort has been made by a few very efficient teachers to secure for obstetrics a proper recognition. The vigorous propaganda by Williams has probably aroused the medical

schools to an appreciation of the necessity for much better facilities for real teaching of obstetrics. From a course practically didactic, with manikin demonstrations and no clinical work, it has been transformed into one clinical as well as didactic. In the last few years clinical obstetrics has been a strong feature in the medical school curriculum. The requirements of the examining boards of the various States reflect the appreciation of necessity of better equipment for the practice of obstetrics, and has been a strong factor in the marked improvement in obstetric training.

A complaint of inefficient teaching of gynecology in the past may be made in full justice. Dealing with the diseases of the female genitalia has had an inherent delicacy which has deterred the teacher from bringing students in as close relation to gynecological patients as to those suffering from diseases of other parts of the body. I submit clinical work as viewed from the amphitheatre has little superiority over didactics and students must be brought in close touch with disease in order to study it to greatest advantage. This fact has been recognized in many clinics and has redounded greatly to the benefit of student and satisfaction of teacher as well.

Of the child, abdominal surgery we may well say it remains at home with its parents. For surely it was brought into existence by gynecology and obstetrics. When we recall the fearless abdominal surgery of Lawson Tait, the cholecystotomy of J. Marion Sims, and the determined effort of the latter to establish prompt laparotomy with suture of the injured viscera as the accepted treatment of gunshot injuries of the abdomen, we at once see the relation of parent and child.

Even the first nephrectomies known to history (both fatal), that of Walcott, of Milwaukee, June 4, 1861, and Spiegelberg, in 1867, were done with the preoperative diagnosis of ovarian or hepatic cyst. The first successful nephrectomy,

that of Simon, in 1869, was done for a severed ureter complicating an ovariotomy. The genius Sims did the first cholecystotomy. Thomas's operation of gastro-elytrotomy was a leader for more precise and better obstetrical abdominal surgery. Much has been written, and timely, regarding the unpleasant sequelæ of laparotomies. A remarkably large proportion of patients whose abdomens had been invaded suffered from intraperitoneal adhesions, intestinal obstruction, fecal fistula, sloughing ligatures, and various other unfortunate conditions originating in the operations. This was such a sad commentary upon abdominal surgery that it acted as an obstruction to the rapidity of growth of the justifiability of this variety of surgery. So much for abdominal surgery as placed upon a sound basis by gynecology and obstetrics.

As yet the general surgeon had little to do with abdominal surgery. Nor was his attention directed practically to it until the specialties mentioned had ripened and prominently and enthusiastically praised this great field of surgery. Its early days without general anesthesia or asepsis must be reviewed by us with shuddering amazement. Many of us have seen it without the latter when it seemed disheartening. To Crawford W. Long, who, like Sims, had been an obscure village physician, and to the creators of clean surgery, we owe no small obligation. It has been markedly developed during the last thirty-five years, so that now no portion of the lower half of the torso has any unknown parts. Even the suprarenal body is being resected for quite definite indications.

It would be unpardonable not to give due credit to bacteriology for its powerful aid in arriving at the intelligent treatment of infections found in the pelvis and the abdomen. One is led to wonderment in the lateness of this correlation of bacteriology with gynesic and abdominal surgery. Even as late as December, 1879, in a debate in which many of

the leading surgeons of London participated, Mr. Timothy Holmes was able to say, "No convincing proof of the germ theory as applied to living tissue and living phenomena has as far as I know yet been offered." It was not until 1881 that the observations of Ogston on the relations of micro-organisms to surgical diseases were published. And not until the publication of Rosenbach, in 1884, and of Passet, in 1885, were the varieties and natural history of the common organisms of suppuration fully described and their identity established. These had to be preceded by the epoch-making researches of Koch on staining methods and culture media. Since then this branch of medicine has attained by wonderful strides a position of vast importance in the three great fields of medicine under consideration.

During the forty years' existence of this Society there have been times when it has seemed the problems of gynecology and obstetrics were practically all solved, that nothing new was to be learned, and that solely practical application of known facts was to be their future. This was, indeed, a gloomy view, for the generation that marks no advance over the work of the preceding one is practically dead. In the field of investigation of the better cementing of the brotherhood of man and uplifting of the human family, in all these advances must be constant. In fact, the very existence of such specialties was thought to be jeopardized. The mechanical part of gynecology, surgery, was being largely taken up by the general surgeon, who, giving little heed to the real foundation of gynecology, that of the study of womankind, perhaps thought that operations constituted the whole field of this branch of medicine. The family physician, entering the practice of his profession very poorly trained in the science and practice of obstetrics, soon secured a rather large obstetric clientèle absolutely by propinquity. He promptly learned that women served in time of such suffering were deeply appreciative and

retained his services for other professional necessities. Such conditions naturally lent themselves to the creation in many minds, even in some great ones, of distinct fear of extinction of these two great sister specialties in our science. And yet the jeopardy was more threatening from other directions. Ominous clouds passed in review. In many medical colleges gynecology, no longer regarded as an important specialty, was obliged to assume an insignificant role in the work of the chair of surgery. In others it was combined with obstetrics in one chair. While recognizing both specialties, this plan robbed both of their dignity and prestige.

Another effort to terminate the existence of at least one of these branches of science was that of the Section on Surgery of the American Medical Association, at a meeting a few years ago to have its sphere extended to include gynecology and abdominal surgery. It failed, however, and at a subsequent meeting of the Association, abdominal surgery was added to the work of the Section on Obstetrics and Diseases of Women. I understand an amicable adjustment has been made, putting abdominal surgery in both of the sections mentioned. The situation of gynecology and obstetrics may now be regarded as stable. I believe no fear need exist of loss of recognition of either. Both are very healthy adults and not to be regarded as "infant industries" needing fostering care. No distinct pause in their development has occurred since the organization of this Society. The training of the medical student in gynecology is on a splendid plane. The graduating student is far more proficient in gynecology today than was the general physician of several years' experience a short time since. The carefully prepared case histories—prepared by students under efficient supervision, the thorough laboratory investigations and opportunity for carefully supervised physical examinations, brings the students to a basis for logical diagnosis—the paramount necessity for correct

treatment. The clinical teacher who frequently states "something is wrong in this abdomen and I will open it and then make the diagnosis," endangers his reputation.

In the teaching institutions the same plan of instruction in obstetrics obtains to a considerable degree. Both obstetrics and gynecology are gaining in this respect, and while we do not expect marvelously rapid transformation in such matters, owing to the marked changes in hospital construction and *régime* necessary thereto, nevertheless a sense of pleasure has come to the teachers in these branches of medicine from the progress of the last few years.

In abdominal surgery the dread of dire results from sepsis, ignorance, shock, hemorrhage, and several other former causes of needless mortality has nearly vanished. While problems in this field of endeavor remain unsolved, diseases of the abdomen are much better understood than formerly. Various aids are now being employed to assist in the diagnosis or treatment of pelvic and abdominal diseases, and I dare say they will have notable extensions. The roentgen ray greatly assisted in the discovery and location of adhesions, neoplasms, ulcers, and stases of the stomach and intestine, determining the presence or absence of biliary, renal, and ureteral calculi, and, indeed, with the ureteral catheter is an extremely reliable agent for determining whether urinary calculi above the bladder exist. We are justified in believing it will prove of great value in diagnosing pregnancy and various abdominal and pelvic tumors. Laboratory findings in luetic and Neisserean, tubercular and other infection though of great importance, must and will assume a still greater role in our agencies. I feel sure that even improvements will be made in more careful investigation of patients' histories and determining the time for operation as well as in the technic followed. Already the surgeon is cautious in radically invading infectious areas, often delaying with advantage when the less skilful would fairly plunge into a

surgical operation. F. F. Simpson has recommended marked delay, even months, for radical operations in infections in and about the uterine appendages. The value of this plan can scarcely be questioned and its universal acceptance may be expected in the treatment of patients who can afford the extra time this requires. It is another feature in the conservative practice that goes with greater knowledge. In ectopic pregnancy his advocacy of delayed operation has been quite universally heeded.

The subject of displacement of the uterus from time immemorial has been a fruitful one for lively and even bitter discussion. Careful study of the forces maintaining the position of that organ are gradually lessening the differences of the past in this respect, and we may reasonably hope for full accord in it. Pelvic non-puerperal infections are steadily losing their terrors, and we may look for them to be practically removed from the class of highly dangerous diseases. This will be largely due to the recognition of the superiority of dependent drainage and conservatism in their radical treatment.

The treatment of cancer of the uterine cervix continues to receive the very earnest attention of gynecologists and special activity in the general subject of cancer during the past three years has been enthusiastically aided by this Society. Thus far the cause of cancer has not been found, and no doubt this must be discovered before we may reasonably expect to gain a mastery over this dreadful disease. Its behavior, as influenced by radium and long-continued, slightly elevated temperature, as advocated by Percy, is of interest. The use of certain rays from radium seem to retard its progress and perhaps completely destroy it, while other rays from it are thought to induce the disease. If the latter be a fact we may well refuse to believe, for the present, that cancer is of microbic nature. Even the Percy method emphasizes this doubt, for it should stimulate microbic

activity; yet its retarding influence on the progress of cancer of the cervix is attested by many careful and reliable observers. But neither of these two agents can be regarded as a specific for this disease, for they are both notably limited in their radius of action. Whether radium has deeper penetrating power as a cancer destroyer than the Percy heating method is a matter of doubt, and the case reported by Boldt throws grave doubt on the penetrating power of Percy's method used for this purpose. This latter method is based upon the application of a low elevation of heat to the involved tissues. And yet for this purpose is employed an instrument so hot that it has constantly to be moved to prevent overheating and gauged principally by the sense of touch through the uterine wall which varies greatly in individuals. If this method is proved a specific against the active agent of cancer, is it not to be the sole agency in the treatment and cure of cancer in the breast, bladder, vagina, vulva, and rectum? If it has a positive specificity for two inches then no part of the human body will be inaccessible to its beneficient influence. It would appear, then, that our hope in cancer of the uterus continues to consist of surgery—as early as possible, universal education on this subject, the employment of radium and high or higher temperatures and unremitting search for the true etiology of it. Radium offers benefit to other forms of neoplasms, particularly to the bleeding uterine fibroid, according to several credible observers. Nevertheless, it is yet but an empiric agent, not available to more than a very small percentage of patients suffering from the many conditions in which it is extolled and not without its evil effects, such as corrosion of tissue. While we may believe enthusiastic faith has had much, far too much, to do with the reported results of radium application, we cannot fail to recognize this agency when properly harnessed has great possibilities in the treatment of pathological conditions. I believe it is deserving of being

absolutely divorced from charlatanry and commercialism. Its exploitation has been unfortunate.

In obstetrics a nearly parallel situation is found in the aid and sympathy several prominent workers and teachers have afforded the sensational use of the various alkaloids of hyoscyamus and opium under the alluring name of "Twilight Sleep." In the sweeping march over the earth's surface of this dangerous method, the professional and moral fibers of even the flower of the obstetric world have been challenged. It has nearly equalled the tales of the French revolution. It is believed the danger of this awful flood has passed and the conscientious and competent obstetrician may now come down from his Mount Aarat and pursue the even tenor of his way. Probably humanity has been benefited by this visitation only to the extent that it has prompted us to take stock of our methods and even of our humaneness, and has appealed, perhaps not unnecessarily, to still greater concern for the suffering of our patients. The outcome of it is superior substitutes for opium and hyoscyamus are now employed. Probably the open mind is now predicting that at no distant date twilight sleep will rarely be recalled to memory and nitrous oxide and oxygen inhalations during labor will be given an enduring place in the obstetric *régime*.

It is highly probable that Cesarean section will be given a wider field of application. The vulnerability of tissues of women, certainly of American women, will be fully recognized, and they will not be subjected to unreasonable and unbearable obstetric strain and avoidable infant mortality. Much greater advance in teaching obstetrics may be expected than has been obtained. Largely to J. Whitridge Williams we should attribute such improvement.

In abdominal and pelvic surgery at its present stage of development, probably no more important matter is before us than the prevention and correction of intraperitoneal

adhesions. A propaganda on this subject should result in untold lessening of human suffering. Very likely an active educational campaign would greatly lessen the evil of post-operative adhesions. The finding of large areas of adhesions in the abdomens of patients who have been previously subjected to laparotomy for simple or "clean" conditions is far too common to escape the attention of the careful abdominal surgeon. Nor is it always the tyro that unnecessarily violates the parietal and visceral peritoneum by undue handling, suturing, etc. Various materials have been extolled as prophylactics against postoperative adhesions. I will not tax your time by enumerating them, but will refer to a few of them. Vaselin, highly regarded by some of America's greatest abdominal surgeons, I feel I must severely criticize. One to three years after I had smeared it over denuded peritoneal areas I have removed from the abdomens of patients encysted masses of vaselin having diameters up to one inch, and have found adhesions were very extensive. In some places these capsules of vaselin formed a dense, rigid, connecting structure between several loops of intestine. Acting upon the theory that "Before a fibrous exudate can form in the peritoneal cavity with its resultant plastic agglutination, there must be the liberation of that hypothetical ferment, thrombokinase, its activation of prothrombin in the presence of calcium and the production of thrombin," Saxon Pope experimented on sixty rabbits and published his work in January, 1914 (*Annals of Surgery*, 1914, lix, 101). These experiments were made with many different materials, and he concluded from this work that a solution of 2 per cent. of sodium citrate in a 2 per cent. solution of sodium chloride was the best remedy. His faith in his conclusions is proved by his reporting in February, 1916 (*Annals of Surgery*, lxiii, 205), the results of the employment of this hypertonic solution in four hundred abdominal operations in the University of California Hospital. Walker and Ferguson

(*Annals of Surgery*, 1916, lxiii, 198), doing one hundred and four operations on sixty-three rabbits, found 3 per cent. of the citrate in 1 per cent. of sodium chloride solution was the most satisfactory, giving complete success in 70.5 per cent. and 88.2 per cent. partial success. Certainly such results merit our attention. In the presence of sepsis or deep or wide destruction of tissue it is not claimed these hypertonic solutions can be regarded as infallible, but even here are of use. In my personal experience with the 3 per cent. solution of the citrate in quantities of 200 to 300 c.c., considerable shock has been noted. Among the questions that automatically arise in our minds are: (1) if it gives absolute success in 70.5 per cent. in mild peritoneal traumatism can its use be extended to success in such severer peritoneal injuries as separated adhesions; (2) how long must it be in contact with the area to be of highest efficiency; (3) what is the duration of its activity; (4) can it be used efficiently in gauze covering large areas of peritoneal denudations and brought out through the abdominal wall. If these questions are to be later answered satisfactorily to us, then we will have positively mastered this much dreaded and dangerous complication—peritoneal adhesions. A careful reading of the papers mentioned will greatly benefit abdominal surgeons and probably result in less adhesions in their work. While I have not subsequently seen the peritoneum in any of the patients in whom I have employed this agency, I have seen symptomatic results quite encouraging. Coffey has recently invited attention to his rubber coffer dam, brought through the abdominal opening, used in separating pelvic adhesions in acute attacks of adnexal infections. Though he specifically claims no hernia follows this prolonged abdominal drainage I fear that claim will not tempt many to use this method of dealing with such conditions. I believe the paraffin-stearic gauze recommended by Fisher (*Journal American Medical Association*, 1916, lxvi, 939),

used as a drainage material for pelvic adhesions and conducted through the vagina, will be found very satisfactory. While I have not attempted to be a seer, yet I have been so impressed by some of these efforts to lessen the dreaded peritoneal adhesions that I have been emboldened to risk tiring you with this rehearsal.

We are at great loss for lack of knowledge of the influence of luetic infection on the pathological conditions we as specialists must treat. In the past the degree of precision in diagnosis of this variety of infection has been so slight that we have not been able to associate with it observed lesions to the degree of certainty that the Wassermann reaction now permits. The routine blood examination reveals a startling frequency amounting almost to regularity of positive Wassermann which quite reliably indicates the presence of lues. It is to be hoped the attention given to this subject at this meeting of our Society will have the much needed stimulating influence on the profession in general necessary to a due appreciation of the momentous importance of recognition of lues in obstetrics and gynecology.

Surely there are very many grave problems to be solved in the fields of endeavor you represent, but I am unboundedly confident this Society will in the future maintain in that work the prestige that has come from the high character of work it has performed.

OFFICIAL REPORTS OF THE REFERATS

ON THE SUBJECT OF

SYPHILIS IN ITS RELATION TO OBSTETRICAL AND GYNECOLOGICAL PRACTISE

"SYPHILIS IN ITS RELATION TO OBSTETRICS"

Dr. Edward P. Davis, Philadelphia

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SYPHILIS IN ITS RELATION TO OBSTETRICS

By Edward P. Davis, M.D.
Philadelphia

Three factors of great importance in the study of this disease have come before the profession in the last ten years, namely: the discovery of the spirochetæ pallida; the Wassermann reaction; and the discovery of salvarsan. These have opened a new era in this branch of medical knowledge, and have divided the facts ascertained concerning syphilis into the older and more uncertain region of learning and the later, more definite and more satisfactory knowledge. We shall in this study concern ourselves with the subject since Schaudin and Hoffmann (*Arbeiten aus den Kaiserlichen Gesundheitsamte*, Berlin, April 10, 1905, F. 2, p. 527) announced their discovery of the germ, which is accepted as the cause of syphilis. They described the parasite as extremely difficult to see in the fresh state and very refractory to stains. Its length varied from 4 to 14 in width to $\frac{5}{10}$ of a micron, while its direction curved in the individual parasite from three to twelve times. It is characterized by great motility, with a rotary action both before and back and flexion of the whole body. The ends of the parasite are sharply pointed. Not only has it been found in the human subject, but Metchnikoff and Roux (*Bull. de l'Acad. de Méd.*, May, 1905, p. 468) discovered the parasite in syphilitic lesions in six apes. Other observers discovered it in great abundance in syphilitic tissue. Hotand (*Lyon Méd.*,

February 21, 1904, p. 847) obtained it in blood from a vein in the arm of a syphilitic child. It was soon demonstrated in the liver and spleen of a child dying from syphilis by Hoffmann (*Berl. klin. Woch.*, June 5, 1905).

One of the earliest obstetric references to the spirochetæ is found in a paper by Brennöm (*Hospitalstidende*, 1905, No. 29, pp. 667–670) in a case of congenital syphilis. The spirochetæ were found in the liver and spleen of a child. Thomsen (*Journal Bibliothek für Laeger*, 1906, 1 and 13, pp. 157–165) studied the changes in the umbilical cord produced by syphilis. The cord was first hardened in 25 per cent. formalin and examined in from six to twenty-four hours later. The most significant changes are those in the walls of the vessels which are thickened and fail to collapse after the cord is tied. In children dying of congenital syphilis he found the spirochetæ constantly throughout the organs where the child had lived until its birth, and the organs showed the characteristic syphilitic changes. In a macerated fetus or syphilitic embryo it was not always possible to demonstrate the spirochetæ. The anatomical changes in various tissues and the number of spirochetæ stand in definite relation, and in the organs of the newborn dying of other causes than syphilis the spirochetæ were never found. The anatomical evidence of its cause and relation seem to Thomsen complete.

An interesting suggestion concerning the part played by the placenta is given by Cappellarne (*Archiv di Obst. e Gin.*, 1906, Anno. 13, pp. 321–328). In two cases of well-marked syphilis in the mother the spirochetæ were not found in the placenta. In a third case, where the child gave evidence of hereditary syphilis, the spirochetæ again were not found in the placenta but in the pemphigoid vesicles upon the child.

Guicciardi (*La Ginecologia*, 1906, Anno 3, pp. 260–272) demonstrated clearly the spirochetæ pallida in the substance

of the placenta and in the placental tissue on microscopic section. So also Radaeli (*La Sperimentale*, also *Archivo di Biol. norm. e patol*, 1906, Anno 60, pp. 397–400) found the spirochetæ in the placenta and internal organs of a fetus born of a syphilitic mother. The parasites were present in small numbers in the walls of the vessels in the villi of the chorion. The connective-tissue of the placenta showed none of the parasites. Mohn (*Münch. med. Wchnschr.*, 1906, No. 47, pp. 23–24) examined the placenta in sixteen cases, among whom were two of tertiary syphilis in the mother who had given birth to a living child. In six of these the spirochetæ were found plainly and in the others in very small numbers and isolated with difficulty. The parasite was never found in the decidua nor in the spaces between the villi nor among aggregations of cellular tissue. It was, however, frequently present in the normal villi, although these were surrounded by new-formed connective-tissue cells. In three cases the parasites were only found at the base of the villi in the connective-tissue, irregularly distributed, a portion of them in the walls of the vessels and others surrounding the vessel walls. They were also present in small buds projecting from the larger and well-formed villi. In three cases the parasites were present in fetal connective-tissue whose interspaces were greatly enlarged and crowded with these germs. In a large artery which had undergone plugging the spirochetæ were present in the material plugging the vessel. In one placenta, where many of the villi were largely devoid of connective-tissue and edematous, the spirochetæ were present in the vestiges of the villi. In the umbilical cord the parasites were present in the walls of the vessel and also in the lumen. In the arteries they were found only once in the outer layer of the walls of the vessels and then in but small number. In the umbilical vein they were constantly present, usually in the wall of the vessel, but never where leukocytes had begun to infiltrate

the tissue. The spirochetæ were not present in the membranes, and apparently the amnion and chorion obtained their nourishment largely from the wall of the uterus and not from a definite vascular supply.

Mohn raises the question as to how the spirochetæ make their way into the placenta, and believes that the evidence all points to their passage from the fetus and not from the mother. Thus they are always present in the villi, but never in the spaces between the villi nor in the decidua. The natural inference is that the parasites are in the ovum or in the spermatozoid, and that during the first weeks of embryonal life they pass from the mother to the fetus and thus finally enter the placental circulation. The fact that they are found so abundantly in the umbilical vein seems to depend upon the anatomical composition of the walls of this vessel. The intima seems free from the parasite, and apparently they breed in the intercellular spaces in the outer layer. It is noteworthy that the umbilical cord gave abundant evidence of infection in cases where no spirochetæ were found in the placenta. Mohn makes the very practical observation that one should utilize the umbilical cord, especially in living children, to make a diagnosis of syphilis.

So far as the frequency of positive results is concerned, Mohn found positive evidence of the characteristic germ. He infers then that in over 50 per cent. of cases of syphilitic women giving birth to children that the umbilical cord shows distinct evidence by containing spirochetæ, while in 70 per cent. of cases where syphilis is definitely proved in one or both parents the placenta will give evidence.

Vollich and Leonditi (*Ann de gyné, et de'l Obst.*, 1906, T. 33, Fever, p. 65) found the spirochetæ in the fetal portion of the placenta in a case of infantile syphilis. Microscopic section through the various organs of the fetus found the parasite present in great abundance. In the maternal portion of the placenta but few could be demonstrated.

The mother had given no signs of syphilis. The writers raise the question as to whether the spirochetæ made their way into the decidua after the expulsion of the placenta, but that this was unlikely. The germs were observed between the connective-tissue and muscle bundles in the larger vessels.

Nathan-Larrier and Brindeau (*Soc. de Biologie de Paris Le Progrès méd*, 1906, p. 86) believes that the spirochetæ pass to the mother through the medium of the leukocytes of the fetus or through rupture of the vessels in the villi. They agree with Vollich and Levaditi that the parasites are frequently in the large cells and the superficial layers of the decidua. They believe that this is the result of a direct passage of the cells of Langhans's layer into the decidua. Occasionally the spirochetæ are found in the infarct in the neighborhood of a villus with or without the presence of leukocytes.

Salmon and Mace (*Bulletin de la Soc. d'obst.*, 1906, No. 7, p. 216) found spirochetæ abundantly in the bodies of newborn children born of syphilitic parents.

Thomson (*Thesis Kabonhaven*, 1906) examined 100 umbilical cords of infants born of syphilitic parents, finding the vessels of the cords infiltrated extensively with leukocytes.

Among the most interesting papers published in the year 1907 upon this subject were those of Bab (*Zeitschr. f. Geb. u. Gyn.*, Bd. 60, 1907). He made an extended study of congenital syphilis, using in his preparations the method of silver impregnation already described by Levaditi. Bab does not believe that syphilis is conveyed through the spermatozoid or through the ovum. Whether the spirochetæ forms spores he could not determine. It was interesting to observe that sections of tissue containing spirochetæ and treated by mercurial solutions showed the remarkable phenomena of the disappearance of the parasites. The

tissues changed color, became translucent, the nuclei of the cells broke up into small portions, and the spirochetæ entirely disappeared. This was obtained in a solution 1 to 5000 of bichloride of mercury. Stronger solutions produced the same effect more rapidly, so that the changes in the tissues could not be so well observed. He also found that organs free from spirochetæ gave extracts free from antigens while those organs which contained spirochetæ produced extracts also containing antigens. The number of the spirochetæ was in proportion to the vigor of the reaction, and this seemed a direct evidence of the specific nature of the spirochetæ. Bab believed that in most cases the placenta contains few spirochetæ, but produces a positive result when antigens are considered. Evidently the placenta must receive like a great sponge a large quantity of soluble syphilitic material, but the granulation cells in the villi seem to have the power of attacking the parasite. It is interesting to observe that the milk of a syphilitic mother contains specific protective material, and this can be demonstrated experimentally—a point of evidently practical importance for the nourishment of the syphilitic child. This would suggest the employment, for a syphilitic child, of a syphilitic nurse. In view of Colles's and Profeta's laws, these observations are of special interest. If the child be syphilitic, its mother will furnish antigens or protective substance and should nurse the child, because the mother is syphilitic. If, however, neither antigens nor protective material be found, she should not nurse and a syphilitic nurse should be obtained. If the mother be syphilitic and the child apparently healthy, by Profeta's law, the child should be artificially nourished, unless an examination of its blood serum should show such abundant protective material as to justify its nursing. If the child has latent syphilis, then a strange nurse and not the mother should nourish it.

In the study of the spirochetæ, Bab examined 64 cases of syphilis and found the parasites in practically all the organs

of the syphilitic newborn. The connective-tissues and the walls of the vessels seemed to be the favorite locations, showing that the germs had made their way in the blood serum and had penetrated from the lymphatics. The parasites were found in the testicle and in the ovary, and were found in the ova in the ovary and also in the Fallopian tubes. They were in abundance in the nose and eyes, in and beneath the nasal membrane in the cartilage of the nose, in the skin and glands of the nasal mucous membrane, and in the eye, especially in the choroid plexus. In all the cases examined they were abundantly present in 40 per cent. In common with other observers, he found them present in the spermatozoid. Their presence in the vesicles of pemphigus, in the palms of the hands and in the soles of the feet can be readily explained by the distribution of the lymphatics. None of the parasites could be demonstrated in cholostrum and rarely in the mother's milk. Where they were not readily demonstrable, Bab believed that the child did not die from the action of the germ so much as from the toxins which it produced. He had no clear belief concerning the exact method of transmission from mother to child or child to mother. The placenta is evidently intended as a barrier between the mother and the child to prevent the passage of infectious germs from one to the other.

Fouquet (*Soc. d'obst. de Paris*, 1907, No. 7) could find no direct relation between the bacteriological and histological findings in hereditary syphilis. The spirochetæ were found principally in the liver, spleen, and kidneys, especially about the vessels—evidently their point of entrance. The more recent the syphilitic infection the greater the number of spirochetæ, while so far as histological changes in the tissues are concerned the opposite is the case. Fouquet believes that where children survive an infection, that the parasites remain latent for a considerable time, and that they may even survive prolonged treatment. He believes that children having

hereditary syphilis should receive specific treatment indefinitely.

In a later paper Bab (*Zentral. f. Gyn.*, 1907, No. 27, p. 839) has observed the effects of mercurial treatment on the number of spirochetæ in a fetus undoubtedly syphilitic. The mother during pregnancy was treated by mercury and iodide of potassium, and the result in the child was seen in the greatly diminished number of parasites. The child's death seemed caused not by the parasites themselves but by the toxins which they had produced. These accumulated from the mother in the placenta and passed through the placental vessels and entire villus spaces to the child. It was interesting to notice that the placenta and cord contained comparatively few parasites, while the fetal tissues about the umbilicus and the fetal vessels showed them in abundance in their walls. In cases where the liver contains no spirochetæ, while other organs have them, one must admit the possibility of an ovular origin for the syphilitic infection, or that the fetus may have inspired infected amniotic liquid.

Mohn (*Zeitschrift f. Gynäkologie und Geburtshülfe*, 1907, Band 59, Heft 2) examined 15 placentæ, 15 umbilical cords, and the membranes in 3 cases to determine the presence of the spirochetæ. Concerning the placenta in general, it may be stated that the deposit of cheesy or albuminoid material in the placenta must not be considered as positive evidence of syphilis. The presence of a gumma or an abscess is strongly suspicious, so also the overgrowth of connective tissue in the villi, leukocytes abundantly present, vessels obliterated, edema, distention of the vessels of the villi are all strongly suspicious of syphilitic infection. In proportion to the degree of development of these lesions and the number of lesions present together is the strength of the suspicion. Syphilitic changes in the cord are more characteristic. Inflammation with exudate in the walls of the umbilical vessels, especially the veins, increase in the con-

nective tissue with infiltration of leukocytes, are very significant. The more extensively the leukocytes infiltrated the vessels the more severe the infection. Wherever the vessels were markedly altered the spirochetæ were invariably present. They were always found in the umbilical vein in smaller number than in the arteries.

Regarding the membranes, Mohn believes that in syphilis the membranes are rarely normal, the chorion being more often infiltrated than the amnion, which alone was never involved. In retained placenta both membranes showed invasion by leukocytes. Gonorrhea and endometritis produced marked changes in the membranes, especially in the chorion. Syphilis in the infant alone does not change the membranes, but if spirochetæ were found in membranes infiltrated with leukocytes, the diagnosis of syphilis would be justifiable. Changes in the membranes do not positively demonstrate syphilitic infection in the fetus.

The writer believes that the spirochetæ travel from the fetus through the umbilical cord to the placenta. They seem to have been in the ovum derived from the mother or to pass through the mother to the fetus early in gestation and thence to the placental circulation. In 50 per cent. of cases the parasites are found in the cord, and in 70 per cent. where the parents were syphilitic, in the placenta. When one remembers that the placenta contains no nerves it is evident that the statement that the spirochetæ have been mistaken for altered nerve fibers and the effects of silver staining cannot be accepted. It is interesting to know that the parasites have been found in the bloodvessels among the corpuscles.

Grouven (*Zentralb. f. Gyn.*, 1908, p. 581) found that the spirochetæ were present in all cases of congenital syphilis by every usual method of examination, the number varying in different portions of the fetal body. In cases where the diagnosis is difficult the demonstration of the spirochetæ is of positive value. Grouven mentions the case of a child

born living but with well-marked ascites, and with no other abnormality. In the fluid obtained by puncture of the abdomen the spirochetæ were found. The child did not long survive, and, on section, the parasites were present in the liver, lungs, spleen, kidneys, suprarenals, and ovaries. In another child, dying a few months after birth, well-marked caseation of both suprarenals was found, and a diagnosis was only made by discovering the spirochetæ in sections from the cortex of the kidney.

Williamson (*Journal of Obstetrics and Gynecology*, British Empire, 1908, No. 5, p. 342) reports the case of a multipara, aged twenty-four years, with a history of previous good health. The first pregnancy had terminated in the birth of a stillborn child of twenty weeks. The second pregnancy ended at twenty-eight weeks in the birth of a dead child. The third pregnancy had gone to the fifth month. The patient showed no signs of syphilis, which the husband denied, nor was there evidence of disease about the mother. She was treated with chlorate of potassium. At the end of the eighth month she gave birth to a dead child, and a year later the same result occurred at nine months. This time fetal movements persisted until a few days before birth of the child. It was finally determined in a subsequent pregnance to induce labor at the end of the eighth month in the hope of securing a living child, but this again resulted in the birth of a macerated fetus. Examination of its body showed the spirochetæ present abundantly in the liver and spleen while none were in the umbilical cord. An effort was made to treat the patient with mercury and iodide of potassium, but her last pregnancy was terminated by the induction of labor at what was supposed to be the eighth month. Unfortunately, twin pregnancy was present and the size of the abdomen caused an error in computing the time of pregnancy. The twins were born living, but survived only a few hours. The spirochetæ were present in both.

Polyhydramnios in one of the twins had something to do with its death. In this case the demonstration of the spirochetæ cleared up the diagnosis and suggested the treatment.

Tisier and Girauld (*Bull. de la soc. d'obst. de Paris*, 1908, ii, No. 9, 366) examined 115 cases to determine whether maceration in the fetus is a positive sign of hereditary syphilis independently of the presence or absence of spirochetæ. In three-fifths of the cases syphilis was undoubtedly present. In two-fifths other causes produced death and maceration. By exclusion they conclude that it is safe to consider one-third of the cases of fetal maceration as not caused by syphilis. Anatomically speaking, the best signs of fetal syphilis are enlargement of the spleen, enlargement of the liver, enlargement of the placenta. The presence of the spirochetæ makes the diagnosis positive. They divide their cases into four classes: First, those in which a diagnosis was doubtful, and of the 115 there were 22 in this category. The mother in these cases did not show the characteristic signs of syphilis, but a positive diagnosis was reached by demonstrating the presence in 17 of the 22.

In the second class the mother presented the typical signs of syphilis, but not in the active stage. There were 22 of these, and the fetus was macerated in each instance, and in 13 the spirochetæ were recognized.

In the third class the clinical signs of syphilis in the mother were evident, and there were 15 births of macerated fetus, 10 of which contained the spirochetæ.

In the fourth class the mother gave no sign of syphilis. There were 35 macerated fetuses born, in 26 of which the spirochetæ were detected.

Baisch (*Zentralb. f. Gyn.*, 1909, No. 42) and (No. 48, 1909) considers the presence of spirochetæ a more definite sign of syphilis than the Wassermann reaction. When the former are present in the maternal tissues of the placenta the syphilis is confined to the mother without attacking the

child. These are the cases which do well under treatment during pregnancy. Nearly all mothers of syphilitic children give a positive Wassermann reaction, but a negative reaction does not prove that the mother is not syphilitic, as the spirochetæ may be retained in the maternal portion of the placenta. That the material which gives the positive reaction does not pass from the fetus through the placenta into the maternal blood is shown by cases in which the mother's reaction is positive while that of the child is negative, or when this relation is reversed. Many children of syphilitic mothers are healthy, and born with a negative reaction.

Graefenberg (*Arch. f. Gyn.*, 1909, Bd. 83, Heft 1), shows how frequently syphilis is connected with maceration of the fetus. In the hospital at Kiel, in a series of 50 cases, in 92 per cent. children with hereditary syphilis were born in a macerated condition. He did not often find spirochetæ in the placenta. In common with other observers, in children born living of syphilitic mothers, we would expect to find the spirochetæ in the tissues of the umbilical cord near the skin of the abdomen. In 39 cases the spirochetæ were also present in the connective-tissue of the abdominal organs, in the media of the umbilical vein and in the cord.

Ssolowieff (*Journ. akusch. i. shensk. bolesnej.*, January 1910) examined 21 placentæ, of whom 13 were from syphilitic mothers, 4 from those who had had syphilis, and 3 from cases of abortion. He found spirochetæ in cases where the fetus showed signs of hereditary syphilis. The changes produced by this germ are sufficient to seriously affect the life of the fetus. More than 50 per cent. of pregnancies in syphilitic mothers end prematurely between the seventh and eighth months. The principal pathological lesions are edema of the villi of the chorion, overgrowth of connective-tissue, especially about the vessels, with narrowing of the intervillus spaces, thus interfering with circulation and

nutrition. The changes in the villi are peculiar to syphilis, and predict the presence of the spirochetæ. Where the ovum is infected the spirochetæ are especially found in the lumen of the vessels of the villi and in their wall, and, as a result, pregnancy may be prematurely terminated. Through rupture of the cells the spirochetæ may pass from mother to fetus, and in a reverse direction. They may also be carried by leukocytes and by Langhans's cells and may penetrate the epithelia of the villi. The lesions caused by this germ in the placenta are the best proof of syphilis in parents and fetus, but a negative result in investigation does not invariably prove the absence of syphilis. The spirochetæ are not found in gumma, and where these are present, pregnancy is often not prematurely interrupted and children are born without symptoms of syphilis.

The writer in a subsequent paper (*Journ. akusch. i. shensk. bol.*, July and August, 1911) found that in 65 per cent. of syphilitic mothers pregnancy was prematurely interrupted, with a fetal mortality of 50 per cent. As in his previous paper he has come to rely upon the demonstration of the spirochetæ in the placenta and cord in cases where the child is living, and where the fetus is macerated he has found the germs in the substance of the liver. He believes that the recognition of the spirochetæ is a much more reliable method than the Wassermann reaction.

The year 1909 in obstetric literature introduces us to the Wassermann reaction and its results in obstetric diagnosis.

Pust (*Gyn. Rundschau*, 1909, No. 12), in the Dresden Clinic, found that in all cases studied clinically where there was reasonable evidence of syphilis it was possible to obtain the characteristic Wassermann reaction, and especially where there had been repeated abortion. When the reaction was positive, treatment was indicated for a long time with intervals, the continuance of the treatment to be determined by the presence or absence of the reaction. Consent to

marry should not be dependent upon a negative reaction, but must be based upon the general phenomena of the case. When parents and children are under observation the latter should be tested by the Wassermann reaction at regular intervals. In police cases the method reinforces the clinical diagnosis. No patient should be recommended as a wet-nurse who has not been tested in this manner, and, should the reaction be positive, she must not be allowed to nurse children other than her own. Where the parents are syphilitic the infant should be examined for the protection of its nurse.

Engelmann (*Zentralb. f. Gyn.*, 1909, No. 3) describes a case in which a woman free from symptoms of syphilis was first married to a man known to have syphilis and gave birth to several syphilitic children. The second marriage with a healthy man again produced syphilitic children. This would indicate that the mother was latently syphilitic.

Bunzel (*Wiener. klin. Wchnschr.*, 1909, No. 36) finds the Wassermann reaction a positive help in diagnosis to obstetricians. It indicates antisyphilitic treatment during the pregnancy, and the test should be repeated during the puerperal period and the patient should be kept indefinitely under observation.

Baisch (*Münch. med. Wchnschr.*, 1909, No. 38) would not trust alone to a Wassermann reaction, but would combine it with bacteriological examination of the fetus and placenta. When the parents give a negative reaction to the Wassermann test, if the fetus is born macerated, syphilis cannot be denied unless no spirochetæ are found in the fetal body. He denies that the infective substance passes through the placenta from mother to child, and in the reverse direction. He finds that 80 per cent. of macerated fetuses are such because of syphilis, but he does not believe that repeated abortion in the first four months is inevitably caused by syphilis. If the mother of syphilitic children reacts posi-

tively to the Wassermann test, she must be considered as syphilitic, although she may be lacking in all the clinical signs. It is possible for a mother to give a negative reaction and still, in all probability, to be syphilitic. Colles's law regarding the immunity of the mothers of syphilitic children and Profeta's law that the immunity of children of syphilitic parents is established, find their explanation in the fact that the mothers and children differ in their resistance to syphilitic infection when once they have been infected. He believes there is no exception to Colles's law. The best results are obtained for both mother and child by a vigorous and systematic antispecific treatment before and during the pregnancy.

Bab (*Zentralb. f. Gyn.*, 1909, No. 15) believes that the condition which he calls latent syphilis exists in women produced by the presence of syphilitic spermatozoids within the genital tract. These may affect the peritoneum, the lymph glands, and may become localized by the absorption of their products and produce cachexia and painful conditions in the joints, and even tertiary symptoms, such as tabes and paralysis. The presence of this condition creates an immunity against other specific infection and produces Wassermann antigens in the milk and blood serum. Such a condition is not contagious in the ordinary way, although spirochetæ may be present in the cervical secretion when infection might occur. In many cases enlargement of the lymphatic glands is the one symptom present, but even this may fail. There may be no condition of the internal genital organs which is abnormal. Such patients may go through the remainder of their lives in apparently excellent health. This latent syphilis may be conveyed to the fetus through the ovum, the decidua, or the placenta. Syphilitic women may give birth to syphilitic children for from six to ten years, but in latent syphilis, the first children are usually sound. When the syphilis becomes manifest it is usually the lighting

up of an old process. Mercury and iodide of potassium influence this condition favorably. Syphilitic children of a mother with latent syphilis may have a healthy father. Occasional exceptions to Colles's law may be explained by an outbreak of latent syphilis or through a reinfection. This should not be mistaken for syphilis of paternal origin and for the immunizing of mother and child as often seen. Many of the exceptions to the commonly received laws concerning syphilis can be explained by this latent condition.

Thomsen (*Berl. klin. Wchnschr.*, 1909) has found that the milk of syphilitic mothers will often give a positive and pronounced Wassermann reaction, and this in cases where the blood serum has produced a negative test. This reaction is present for the first two or three days after the milk forms, but if the child nurses, it tends to disappear, and in women where the children do not nurse it lasts but two weeks. During the latter days of pregnancy the same reaction can be obtained in milk taken from the breast. He also finds that in the milk of mothers who were not syphilitic the Wassermann test gave a positive reaction during the first days of the puerperal period, but in a much less decided form than in the case of syphilis.

Baisch (*Münch. med. Wchnschr.*, 1909, and *Proceedings* of Gyn. Society of Strassburg, 1909) believes that the Wassermann test should not be relied upon without a bacteriological examination of the fetus and placenta as well. When the parents give a negative Wassermann reaction and the examination of the placenta and the cord is negative for spirochetæ, one may assert that syphilis is absent. The so-called Profeta's immunity consists in the fact that the child is syphilitic, as demonstrable by the presence of spirochetæ. No suspected case can be thoroughly studied without careful examination of the placenta.

Bunzel (*Verhand. d.* 13, *Gyn. Kong.*, 1909, p. 459), in experimenting with the Wassermann test, found a negative

reaction always obtained in mothers and children who were not syphilitic. Where there was no doubt concerning the existence of syphilis the test was positive. In 13 cases of individuals not syphilitic he still obtained a positive reaction in the maternal blood. These women were apparently normal. Three had had scarlet fever previously and one had passed through several febrile illnesses. Five had severe eclampsia, and, as they grew better, the test became negative.

Knoepfelmacher and Lehndorf (*Wien. med. Wchnschr.*, 1909, No. 38) took the ground that a woman who had given birth to a syphilitic child is herself syphilitic. A few weeks after labor such women, in 72 cases, gave a positive Wassermann reaction in 91 per cent. After several years had passed, from 40 to 50 per cent. of them still gave a positive reaction. Mothers supposedly exempted by Colles's law, gave the syphilitic reaction. The writers did not believe that the conveyance of syphilis from the fetus to the mother is possible. In the great majority of cases of syphilitic mothers the children also are syphilitic, although it may not always be possible to demonstrate this.

Fraenkel (*Verhand. d. 13, Gyn. Kong.*, 1909, p. 434) has studied the question of recommending a woman as wet-nurse with or without a Wassermann test. He believes that the test should be invariably made, and he found it strongly positive in the cases where the fetus has been born macerated. Mothers coming under Colles's law gave a positive reaction. One cannot deny the possibility of infection of paternal origin, although it is difficult to prove. Profeta's law indicates the prolonged immunity of an apparently healthy child. A positive Wassermann reaction in an infant apparently healthy points to the speedy appearance of the clinical signs of syphilis. So far as treatment is concerned, the mother of a syphilitic child giving a positive reaction is unquestionably syphilitic, although she may have no gross and apparent lesion, and should receive energetic treatment. The appar-

ently healthy child of a syphilitic mother, should the child give a positive reaction, also needs active treatment.

Bauer (*Jahrb. f. Kinderheilk.*, 1909, p. 594) describes a modification of the Wassermann reaction, which is especially useful in the case of infants, as they produce a comparatively small quantity of antibodies. Where the mother gives a positive reaction, the children do also; so do children who have the clinical phenomena of syphilis, but there are those without apparent symptoms who do not react to the ordinary test who may still be capable of conveying infection to nurses. The milk of the mother (syphilitic) should give the Wassermann reaction. All hereditary syphilis is maternal, and the immunity of the mother is only latent syphilis. Profeta's law is explicable only on the ground of a long period of latency. The Wassermann reaction cannot be relied upon for absolutely positive information.

Francke (*Zentral. f. Gyn.*, 1909, No. 42) believes that immunizing substances of the mother may be transferred to the fetus. He does not believe that the opposite occurs. In 100 per cent. of the mothers of syphilitic children the Wassermann reaction was positive, although four of these children gave negative results when examined for spirochetæ. He believes in maternal infection, although it is not possible positively to exclude paternal infection. Where the Wassermann reaction is negative, he warns against antispecific treatment, as it sometimes produces very bad results.

Bar and Dunay (*L'Obst.*, 1909, No. 1) have tested the Wassermann reaction and do not believe that a negative result proves that the patient is healthy, while a positive reaction must lead us to consider her as syphilitic. In pregnant women with florid syphilis who undergo specific treatment the Wassermann test gives a less definite result as the treatment progresses. The reaction seems less positive also oftentimes with pregnant than with non-pregnant

patients when the latter have well-marked specific symptoms. It is thought that in the case of the pregnant patients, infection through the placenta produces a less virulent type than where the poison enters by an initial lesion. In pregnant patients who give no actual clinical symptom the Wassermann reaction is often negative. A positive reaction can be obtained in acute syphilis which has not yet produced gross lesions or where a pronounced infection of the fetus is present. In testing these cases by securing the reaction with the serum of the mother, or the child, differences are found which we are not yet in a position to explain. Where the mother had florid syphilis the reaction is less often positive in the serum of the child than in the mother, and, in a reverse order, where the maternal syphilis is not pronounced but probably present, the serum of the infant will give a stronger reaction than that of the mother. Where the mother acquired syphilis after conception, the Wassermann reaction is much more pronounced than that given by the child. The mercurial treatment of the mother influences the Wassermann reaction and may bring about the negative result in the serum of the child. This is especially the case where the maternal syphilis is not florid or where the mother has received treatment for a considerable time.

Artom di Sant. Agnesi (*Atti. Soc. Ital. Ostetr. e Gyn.*, 1909, vol. xiv), in the Clinic at Rome, has tested the Wassermann reaction. In cases of florid syphilis he obtained a positive result in from 11 to 12 per cent. Where fetal malformations were present, where there was no anatomical or apparent sign of syphilis, reaction was negative. He does not accept Colles's and Profeta's laws in view of modern pathological knowledge of syphilis. He also denies the passage of the antibodies from the fetus through the placenta to the mother. He considers the Wassermann reaction a good criterion, but a syphilitic person who has received treatment can produce healthy children. In his

studies and experiments the writer used the watery extract of the syphilitic liver to obtain the antigens.

Minassian e Viana (*Folia Gyn. Pavia*, 1909, vol. ii, Fasc. 1) used the Borde-Wassermann reaction in the early stages of syphilis, obtaining positive results in from 25 to 30 per cent.; with patients in the second period of syphilis the test was positive in 86 to 87 per cent., and in the third period in from 83 to 84 per cent. As antigens the writer used extract of the liver and placental and umbilical cord extracts. The substances obtained from the non-syphilitic placenta gave a distinctly less positive result than that taken from connective-tissue in a syphilitic patient. In addition to the blood serum the syphilitic antibodies were found in the milk, amniotic fluid, vessels of pemphigus, and in the fluid of syphilitic hydrocele. Mercury seemed to have no special influence upon the working of the reaction. The attempt to demonstrate antibodies in those not syphilitic failed.

Falco (*Zentral. f. Gyn.*, 1910, p. 39) describes a reaction of blood serum which pertains during pregnancy and the puerperal stage. This is brought about by the use of the Wassermann method, except that in the place of the antigen, alcohol is employed. A positive result of this reaction is shown in the complete control of the hemolysis. Among puerperal women the reaction is positive during the first ten days after the birth of the child. With women who were not and had not been lately pregnant, in 13 cases the reaction was negative in 10.

Knoepfelmacher and Lehndorff (*Jahrb. f. Kinderheilkunde*, 1910) found that 90 per cent. of the mothers of syphilitic newborn children gave a positive reaction to the Wassermann test. During the following year the positive reaction sank to 44 and 50 per cent. in the same patients. It seems reasonable to conclude that mothers giving birth to syphilitic children will give a positive reaction, although they themselves may show no characteristic signs of syphilis.

As regards the question of Colles's law and latent syphilis in the mother it is evident that the placenta must differ in different cases in its power to transmit infectious material. It seems very doubtful if such infection passes from mother to fetus, or if this happens so regularly as to establish such a law as Colles's, there is a lack of complete coincidence between mother and child in this respect, aside from clinical phenomena and, judging by the Wassermann test only, the greater number of mothers who have syphilitic children must themselves be considered syphilitic. The paternal transmission of syphilis is the exception and not the rule. It is impossible to say in what period of pregnancy the fetus is most apt to become infected. The spirochetæ may pass through the placenta during any period after its formation. The later the infection the more vigorous is the child, and in some cases infection undoubtedly occurs shortly before birth.

Pedrini (*Annali di Ostetr. e. Ginec.*, 1910, Milano, Anno 32, vol. ii, Nr. 8) made over 200 tests by the Wassermann method of maternal and fetal serum. Among pregnant patients supposed to be perfectly healthy 10.7 per cent. gave a positive Wassermann reaction, although the fetus in these cases very rarely responded. Mothers that had the usual symptoms of syphilis and also newborn children did not fail to give a positive Wassermann reaction. In cases where the mother was apparently healthy but the fetus had been born macerated the mother gave a positive reaction in one-fourth of the number. It is interesting to observe that the macerated fetus often failed to give a positive Wassermann reaction even when the mother was unquestionably syphilitic. Of the cases of abortion coming under his observation 4 per cent. gave a positive Wassermann reaction.

Heimann (*Berl. klin. Wochenschr.*, 1911, Nr. 31), examined 79 pregnant patients with the Wassermann test, obtaining 60 negative results. In his study of abortion he was not able

to demonstrate a directly causal relationship between syphilis and abortion. He believes that the old laws of Colles and Profeta have lost their significance in view of modern tests. With other observers he believes that the infection of the child almost invariably comes from the mother. Where mother and child give a positive reaction it can do the child no harm to nurse, but in other cases the child should not nurse. In only four of his cases did the child seem influenced favorably by salvarsan given to the mother.

Björkenheim (*Prakt. Ergebn. d. Geburtsh. u. Gyn.*, 1911, Band 3, p. 1) in 57 cases in which he was able to examine the father, the mother and the child, by the Wassermann method, found that a Wassermann reaction does not positively exclude paternal infection. In most cases of hereditary the mother gave a positive reaction, denoting the condition known as latent syphilis. In cases with a clear clinical history, and especially those having repeated abortion, the Wassermann reaction is positive. When either father or mother has syphilis the blood of the child should be examined by the Wassermann test, and when the child has syphilis the blood of father and mother should be examined. All wet-nurses should receive the Wassermann test and children given to a wet-nurse should also be tested. Where the mother and child give a positive result, or where the child reacts positively and the mother in a negative way, nursing should be abandoned. If the child should give a negative reaction and the mother a positive reaction the child should be artificially fed. Where the mother gives positive reaction during pregnancy antisyphilitic treatment is indicated and, as a result, the reaction may be negative after the birth of the child. He has seen mothers giving positive reaction and receiving treatment during pregnancy give birth to children who have no symptoms of syphilis and who gave a negative reaction. It is well to delay antisyphilitic treatment with

newborn children until some positive sign of syphilis develops. Where the mother gives a positive test and the child negative the examination should be repeated after a short time. Where the birth is premature or the fetus stillborn the fetal liver and suprarenals should be examined for the spirochetæ.

Heinemann (*Prakt. Ergebn. d. Geburtsh. u. Gyn.*, 1911, Bd. 3, p. 1) has studied at considerable length the use of the Wassermann reaction. He has found that in cases of eclampsia and in pregnant women a positive Wassermann reaction can be obtained when there is no sign or symptom of syphilis. This reaction fails also in cases of malformation, well-marked carcinoma of the uterus, condylomata, and puerperal septic infection. He, too, considers Colles's and Profeta's laws as obsolete, and ascribes the source of fetal infection to the mother. 80 per cent. of children born macerated are syphilitic. 60 per cent. of premature labors are the result of syphilis, excluding cases of eclampsia and placenta previa. 20 per cent. of habitual abortions result from syphilis. Where a positive Wassermann reaction is obtained during pregnancy the prognosis is bad for the child. When a syphilitic child is born, both parents should be considered syphilitic and should be subjected to treatment. This applies also when the child seems to have a secondary or modified form of the specific infection. It is well to err on the side of taking extraordinary precaution in the matter of antisyphilitic treatment.

Balaban (*Zentral. f. Gyn.*, 1911, No. 13), in cases of habitual abortion, although the Wassermann reaction is negative, treates the patient with antisyphilitic treatment.

Semon (*Zentral. f. Gyn.*, 1911, No. 14, p. 556) has used the Wassermann reaction in cases of eclampsia in the clinic at Königsberg. Where the eclampsia was mild the Wassermann reaction was negative, but in 13 severe cases it was positive in 3, negative in 9 and doubtful in 1. The reason

for the positive reaction in some cases of eclampsia is not as yet explained.

Weber (*Die Syphilis*, Berlin, 1911) examined 67 cases of pregnancy terminating before the twenty-eighth week by the Wassermann reaction. In 35 which ended within the first four months there was no positive result. Of the 32 later cases, 12 gave a positive reaction, and the examination of 9 dead fetuses from these mothers showed spirochetæ in 6. In 33 cases of recurrent abortion, 6 only gave a positive reaction.

When the macerated fetus from these patients was examined the spirochetæ were found in 84 per cent. of the organs, most often in the adrenals and next in the liver, lungs and near the great bloodvessels. The ovary, testicle, and epididymis contained the germ, although it was not often found in the spleen. Where newborn children developed pemphigus the spirochetæ were found in the vesicles. If it was present in the organs of the fetus the parasite was also discovered in smaller numbers in the placenta. It circulates in the fetal blood, penetrating the vessels and villi of the placenta and chorion, causing thickening of the syncytium. In these cases on gross examination the placenta showed no sign of syphilis.

Zur-Mühlen (*Russki Wratsch*, 1912, No. 38) gives the clinical history of 8 cases in which the cause of habitual abortion was obscure. With the exception of 1 case in which the Wassermann reaction was positive, syphilis could be excluded in both father and mother. In two patients the urine contained a trace of albumin, but in the third it was normal. In six patients the mother received a systematic treatment with potassium iodide during the entire pregnancy. These women gave birth to full term and healthy children. In one case with a negative Wassermann reaction the iodide treatment produced no result. The writer urges the value of such treatment in all cases when giving the history of habitual abortion or habitual premature labor.

Schmidt studied 692 cases of abortion and premature labor in the clinic at Bremen (*Monatsschrift f. Geb. u. Gyn.*, 1912, Bd. 36, H. 5). It was observed that the number of abortions doubled in five years and that the number of births at full term showed a marked decrease. The mortality in 692 abortions was 4.01 per cent., and of these patients 77.5 per cent. were married and 22.5 per cent. were unmarried. Pregnancy came to an end before the end of the third month in 69.6 per cent.; after the second month in 30.4 per cent. In 511 cases the primiparæ were 21.7 per cent.; the multiparæ 78.3 per cent. One-third of them all, or 230 cases, were between 15 and 25 years old. 48.5 per cent. were between twenty-six and thirty-five years, and 18.2 per cent. from thirty-six to fifty years. 442 patients had had 1112 labors and 718 premature births. The ratio among these patients between full-term births and abortions was 2.5 to 1.3. According to Schmidt's studies, syphilis does not play so important a part in causing abortion as is commonly believed. In 34 cases examined by the Wassermann test but 14.7 per cent. gave a positive reaction. 85.3 per cent., of abortions are artificially produced by direct interference; the remaining 14.7 per cent. ended spontaneously or by manual interference or by some foreign body introduced within the uterus. Schmidt has not had satisfactory results in attempting to isolate different bacteria in these cases and he has no faith in antistreptococcus serum in abortion complicated by septic infection.

Daunay (*Pariser geburtshülfe Ges.*, March 16, 1911) advises caution in relying upon the Wassermann reaction, as he has found it repeatedly positive in cases of eclampsia with well-marked jaundice. Zubrycki (*Lwowski Tygodnik Lekarski*, 1912, No. 21, p. 327) has also obtained a positive Wassermann reaction in cases of eclampsia.

Massoni (*Atti. della Societa Ital. di Ostetr. e. Gin.*, 1912, vol. 18) has examined 13 cases of twin pregnancy to obtain

the Wassermann reaction. It was negative in 12 and doubtful in 1. That the Wassermann reaction may be of value to medicolegal cases is shown by Leer (*Gross's Archiv.*, 1912, Bd. 47, p. 324). In determining the existence of syphilis, the conveyance of syphilis, the question of marriage, and other cases requiring expert testimony, the Wassermann reaction may be of positive value.

Plaszek (*Med. Klinik*, 1912, Bd. 7, Nr. 17) describes the case of a patient, aged sixteen years, a sexual degenerate, where a correct diagnosis as to the cause of the patient's abnormal condition was not obtained until a Wassermann reaction was found positive and the presence of syphilis cleared up the diagnosis.

Thiberge and Weissenbach (*Annales d'Hyg. publ. et de méd. lég.*, 1912, 4 Folge, Bd. 17, p. 81) called attention to the medicolegal value of the Wassermann reaction in cases where it is supposed that syphilis has been conveyed from nurses to children or from children to nurses. He does not believe that a negative result absolutely excludes the possibility of syphilitic infection, but it is his experience that a positive result gives strong reason for believing that syphilis is present.

Epstein (*Prager med. Wchnschr.*, 1913, Bd. 38, p. 621–622) has tested all patients admitted to the Prager Foundling Asylum by the Wassermann reaction. He found 10 per cent. of the mothers and 33 per cent. of the children giving the positive result. Three-fourths of the mothers had no clinical symptoms whatever of syphilis.

Sabin (*Ann. des malad. vénér.*, 1913, Tome 8, p. 263–281) examined 23 mothers giving signs of syphilis by the Wassermann test and obtained a positive reaction. Sixteen of their children gave a positive reaction during the first week after birth. Five of these died of syphilis and within a short time. The remaining 7 children at the beginning gave a negative reaction, but 4 developed a positive result in the

second month of life while the remaining 3 did not show a positive reaction until the sixth month. The children apparently had latent infection. The later in the pregnancy that the mother becomes infected the greater is the chance of escape for her child. Where the newborn child gives a positive reaction it should not nurse, and with a negative reaction on the part of the child and a positive on the part of the mother the child should receive artificial food and only nurse after the mother has had antisyphilitic treatment.

Uhlenhuth and Mulzer (*Deutsche med. Wchnschr.*, 1913, Bd. 39, pp. 879–881) found that the milk of syphilitic mothers can be infectious without giving direct evidence on microscopic examination of the presence of the spirochetæ pallida. Guinea-pigs vaccinated or injected with this germ acquired the specific infection. In one of these patients the Wassermann reaction was positive, and the child was evidently syphilitic.

Balaban (*Journ. akusch. i bolesn.*, January, 1913) treated two patients who had repeated births of dead children and negative Wassermann reaction with potassium iodide and mercury during pregnancy, both patients going to term and giving birth to healthy children. A third patient had a very positive Wassermann reaction and received salvarsan and gave birth to a healthy child, mother and child after birth giving a negative Wassermann reaction. Balaban does not believe that a negative Wassermann reaction contraindicates antisyphilitic treatment in cases where there is reasonable suspicion that syphilis exists. He thinks it rational to believe that salvarsan, by destroying the spirochetæ in the mother, may save the life of the child. He believes that this remedy should be used in all cases of abortion or birth of dead children where no cause can be assigned and where the Wassermann reaction is negative. Additional testimony of the positive value of the Wassermann reaction is given by Sarateneau and Velican (*Monatsch.*

f. Geb. u. Gyn., 1913, Bd. 37). They examined 5 pregnant and 22 puerperal women with unfailing positive results where syphilis was proved to be present.

Hesse (*Wiener klin. Wchnschr.*, 1915, Nr. 3) distinguishes two groups of non-syphilitic disorders in which the Wassermann reaction may be positive. To the first group belong diseases caused by protozoa, while in the second are included scarlatina, tuberculosis, malaria, pneumonia, lupus erythematodes, carcinoma, and sarcoma in which the Wassermann reaction is often positive. In 11 cases of pemphigus and dermatitis herpetiformis the Wassermann reaction was positive in 9. In but one case was syphilis also present. The writer believes that all cases of pemphigus give a Wassermann-positive test, independently of syphilis.

Fildes (*Journ. Obstetrics and Gynecology of the British Empire*, March–May, 1915), in discussing congenital syphilis, made the Wassermann test on the mother when she brought the child for examination two and a half to four months after birth. In each case in which a positive result was obtained in the child, or either from the placenta at or after birth, the mother also gave a positive reaction. This coincides with what has been observed by others and with the belief now held by most obstetricians: that a woman who bears a syphilitic child herself becomes syphilitic. This makes it practically impossible to maintain the contention that a fetus within the womb can be directly infected by the father.

Fildes examined 16 other women, obtaining positive reactions, although their children were healthy and gave only negative reactions. In 677 women, 27 gave positive Wassermann reactions, or 3.9 per cent. Of these, 16 syphilitic women bore healthy children with negative reaction; 7 syphilitic women had healthy children with very transient positive placental reaction; 3 syphilitic women had healthy children who subsequently gave a positive reaction, and 1

syphilitic woman bore a syphilitic child. So but 4 of 27 syphilitic women had syphilitic children. As regards the application of the Wassermann test it may be difficult to obtain a sufficient quantity of blood from an infant without damage or without attracting the attention of a parent or friend. So many observers have taken blood from the umbilical cord for this purpose whether the child was diseased or not. This may lead to error, and syphilis may escape detection because this blood from the umbilical cord was used. Syphilis in the infant cannot be accurately diagnosed in this manner. In fact the majority of women giving a positive reaction do not give a positive reaction in the blood of the umbilical cord, so placental blood is no index to the amount of syphilis among these patients. As regards the Wassermann test, Fildes did not consider it necessary to prolong the observation after the infant was four months old.

It is very desirable that serologists, in order to have some definite standard for the Wassermann reaction, should know what substances are used in making the test and some definite scale of results should be adopted. A painstaking and elaborate method for determining this is given by Heimann (*Jour. Am. Med. Assn.*, May 1, 1910). It is of practical interest to laboratory workers only, and includes a formula by which the calculation of the percentages representing the positive nature of the test may be made.

THE LUETIN REACTION

Noguchi, who first successfully cultivated the spirochetæ, devised a method of using these results known as the luetin skin test for syphilis. This is practically a cutaneous vaccine test. It has been studied also by Kaliski (*New York Medical Jour.*, July 5, 1913) and Fon (*Journal of Cutaneous Diseases*, August, 1912). It is very difficult to isolate or

cultivate the spirochetæ. When the preparation has been prepared from the organism a fine hypodermatic needle is used to inject it into the upper layer of the skin until a small raised surface results, 0.05 c.c. to 0.07 c.c. being the average quantity used. If the test is positive a papule with a well-defined infiltrated space about 8 mm. in diameter develops, lasting three or four days, or softening and forming pus. A slight reaction in redness or infiltration is not the genuine test. When a severe reaction develops a small abscess may form which ruptures, or its contents may be absorbed and an infiltrated and pigmented area remain for sometime. Experience shows that this test is most useful in tertiary syphilis, although even then the Wassermann was more reliable than the luetin test. In hereditary syphilis the luetin test is sometimes positive. So far as the obstetrician is concerned the method cannot be said to have definite practical value as yet.

SYPHILITIC INFECTION IN THE MOTHER.

Fournier (*Bull. de l'Ac. de Méd.*, October 9, 1906, vol. ii) in his studies in syphilis estimates 20 per cent. of all his cases were women married, of whom 70 per cent. had acquired the syphilis before marriage and 30 per cent. afterward. In 76 per cent. signs of syphilis appeared in the first six months after marriage; in 8.4 per cent. in the second half of the first year of married life, and in 5.8 per cent. during the second year of marriage. In a small number of cases the disease did not show itself until six or eight years after marriage. Fournier ascribes this condition to the ignorance and lack of intelligence in a general population concerning the possibility of marital infection. Saias (*Thèse de Paris*, 1907) describes several cases of stenosis of the cervix uteri, resulting from syphilitic infection. One can

readily see how this condition could complicate parturition. Maraller (*Zentral. f. Gyn.*, 1908, No. 21) describes the case of a woman married four months who had the initial lesion of syphilis on the vaginal portion of the cervix. The patient was a primipara, aged twenty-nine years. The lesion was the size of a quarter-dollar piece at the edge of the os, having a smooth, shining surface of a dark-yellow color and surrounded by red and livid tissue. No alteration could be found in the mucous membrane of the mouth or about the jaws. The inguinal glands were slightly affected. There was an exanthematous eruption on the buttocks and a maculopapulous eruption on other portions of the body.

Casiglia and Ciando (*Bull. de. la Soc. d'Obstétr. de Paris*, 1908, 11 Année, Nr. 6 u 7) described a syphilitic closure of the external os in a patient in her second pregnancy. The cervix was completely obliterated so that the vagina seemed to end in a blind pouch. It was necessary to dilate the external os with instruments sufficiently to make free incisions. Labor was terminated by basiotrypsy on the dead child. The mother made a good recovery without disturbance during the puerperal period.

Syphilis in its relation to marriage is discussed by Scholtz (*Monatschr. f. Geburtsh. u. Gyn.*, 1908, Bd. 27 and 28). He finds that in 75 per cent. of cases where women have acquired syphilis after marriage the husband became syphilitic less than three years before marriage, and that the first three years after infection are most dangerous, so far as marriage is concerned. During the first five years after the initial lesion the possibility of conveyance is considerably less. For making a positive diagnosis in cases where the question of marriage came up Scholtz had not found the Wassermann reaction absolutely reliable. His own experience led him to believe that the syphilitic man or woman should receive continuous and energetic treatment for at least six years before marriage. Among the many

complications which syphilis may bring to the pregnant woman, Herzfeld (*Archiv. f. Gynäkologie*, 1907, Band 82) calls attention to premature separation of the normally implanted placenta. Some years ago the maternal mortality from this accident was 50 per cent. Under modern methods of diagnosis and treatment it has been reduced at present to 29 per cent., although the fetal mortality remains from 82 to 79 per cent.

It is evident from these statistics that syphilis in causing placental disease is a complication of a serious nature for the pregnant woman.

The mode by which the mother conveys syphilis to her offspring or herself becomes infected is always a subject of interest. Rietschel (*Med. klinik.*, 1909, Nr. 18) is firmly convinced from his observations that the mother of a syphilitic child is syphilitic. Some idea can be obtained as to when the maternal infection arose by studying the condition of the placenta. The more extensive the syphilitic lesions the earlier in pregnancy did the infection occur. If, however, syphilitic changes in the placenta are recent and inconsiderable the mother's infection may actually have taken place during labor. He denies positively the possibility of paternal congenital syphilis transmitted to the fetus.

Pinard and Girauld (*Gaz. des Hôp.*, 1909, Nr. 115) have studied the influence of syphilis upon pregnancy.

Pinard in 239 syphilitic pregnant women reported a mortality of 73 per cent. This probably arose from mixed infection occurring during labor, whereby sepsis was added to the syphilitic poison. He recognizes syphilis of paternal and of maternal origin as transmitted to the fetus and believes that maternal syphilis is more fatal to the fetus than paternal. For the child, the most dangerous period after birth is the first three years and, unfortunately, the action of the syphilitic virus is not less in the second generation than in

the first. Although modern methods of diagnosis may be useful, he relies for treatment upon mercury only.

Lucas (*Brit. Med. Jour.*, Febuary 1, 1908) believes that syphilis acquired by the mother after conception at any period of her pregnancy may be transmitted to the fetus. This usually happens during the first six months and in more than one-third of these cases pregnancy is interrupted. In the last three months the child is often infected, but symptoms appear days, or even months, after its birth. Pregnancy usually goes to its natural end and, as a rule, the child survives. Infection is conveyed through the blood channels and the spirochetæ penetrate to the placenta.

Baisch (*Zentral. f. Gyn.*, 1909, No. 28, No. 42) from the study of one hundred cases of syphilis complicating pregnancy, believes that Colles's and Profeta's laws should no longer be recognized as valid. He believes that a certain percentage of primiparæ (in the most liberal estimate 8 per cent.) although giving birth to syphilitic children, may themselves escape infection, but that with each renewed pregnancy the danger of infection increases enormously. 90 per cent. of all mothers having syphilitic children are certainly syphilitic, although two-thirds of these women may not show the slightest sign of syphilis. In his experience mercury treatment during pregnancy is most successful.

Bab (*Zentral. f. Gyn.*, 1909, No. 15) finds that so-called latent syphilis in the woman can no longer be denied, and that it may be considered as ovogenous, decidual or placental in the method of its transmission. While in active syphilis women have syphilitic children from six to ten years after the initial infection, in latent syphilis several healthy children may be borne before the disease becomes active in the mother. Mercury and potassium iodide are still valuable in latent syphilis. Syphilitic children from a latently syphilitic mother may have a healthy father. Exceptions to Colles's law can best be interpreted through the doctrine of latent

syphilis and the spontaneous appearance of later lesions, or through the fact that latent peritoneal or glandular syphilis in the woman may cause a reinfection of the skin.

Bab does not deny the possibility of paternal infection by syphilis and the immunizing of the mother through the child and the reverse process.

Fraenkel (*Monatschr. f. Geb. u. Gyn.*, 1910, Bd. 31, Heft 2 and 3) believes also, in the fact that the mother of a syphilitic child cannot remain immune but becomes practically syphilitic. Where the mother is apparently healthy and the child is macerated the mother's latent infection has a much more important bearing upon the maceration than is often supposed. He believes that all cases where the fetus is macerated point strongly to syphilis. It is possible to imagine a condition where the immunity of the child may gradually cease through the continued infection of the mother without necessarily symptoms of acute syphilis appearing. A positive reaction with the child does not prove immunity, but only that the child itself is syphilitic. In his studies he never found a positive reaction in the child with a negative reaction in the mother. Although he observed that the placenta rarely contained spirochetæ, he did not believe that was an argument that the placenta acts as a filter against the germs. In the treatment of these cases it is often not possible by mercurial administration to change a positive to a negative reaction. Although the patient may be apparently healthy, should the reaction be positive, it is well to give antispecific treatment. He urges that physicians should not wait until the characteristic eruption appears upon the mother.

Bering (*Deutsche med. Wchnschr.*, 1910, No. 5) joins those who deny immunity in the mother of syphilitic children. The children of syphilitic mothers are not immune to syphilis, but either syphilitic or healthy.

Knoepfelmacher and Lehndorff (*Jahrb. f. Kinderheilk.*,

1910, 3, Band 21, Heft 2) draw attention to the difficulty at times in making a diagnosis of syphilis through the bacterial examination of the placenta. The body of the fetus is a much better culture medium for the characteristic germ and will give much more positive results. The umbilical cord and the liver of the fetus are the favorite sites of infection.

Jaeger (*München. med. Wchnschr.*, 1910, pp. 1826–1829) has studied the relation between premature fetal death and syphilis in the mother and puerperal morbidity. In 67 cases there were 54 in which the cause of fetal death could be absolutely demonstrated. Of these 46 were from syphilis, 6 from nephritis, 1 from anomaly in the placental development, and 1 from infection in the amniotic liquid. While among the large number of mothers the morbidity percentage was 17, among those having syphilis it rose to 36 per cent. There were 2 fatal cases in this series. One woman had given birth to a macerated child; the other mother died of nephritis. In 31 per cent. of these cases the lochial discharge was foul. A frequent complication of labor in syphilitic women is the retention of a portion of the placenta or membranes. It was interesting to note that the morbidity of the mother is higher when the child is born living or has just died before birth, than in cases where the child has died sometime previously and has undergone partial decomposition. This Jaeger explains by the fact that the birth of a macerated fetus is usually short and with comparatively little laceration or pain. In one series of specific cases the mother died of puerperal septic infection fourteen days after labor, having the characteristic syphilitic roseola and condylomata. No vaginal examination had been made in this case during labor. The birth was spontaneous; the placenta and membranes were entirely expelled. A chill with temperature of 104° F. developed on the third day; fever was high and intermittent, and on the eleventh day both hypo-

gastric vessels were ligated without result. On the thirty-seventh day after the birth of her child this patient died. In three cases which were severely infected but recovered, there seemed to be in two of them no doubt but that the characteristic syphilitic lesions on the external genital organs had been the source from which infection was conveyed through vaginal examinations. It seems rational to suppose that the specific infection lowers the patient's resisting power against puerperal sepsis. He advises that in syphilitic patients labor should be conducted without vaginal examinations as much as possible, and that every effort be made to disinfect and render aseptic external syphilitic lesions.

That syphilis may affect the kidney is illustrated by Hirsch (*Zentral. f. Gyn.*, 1909, No. 35). His patient was aged thirty years and in her fifth pregnancy. The previous pregnancies had been complicated by nephritis and edema, hydrocephalus in the child, and the patient had weak and inefficient pains through labor. During the present gestation the patient had been treated for nephritis, but developed polyhydramnios and came into labor with a dead and hydrocephalic fetus. The child was found to have ascites, large spleen with fibrous tissue in the capsule, and enlarged thymus and liver. After the child was born the patient became worse, the right kidney was found considerably enlarged, and, as the patient's tissues were thin, the surface of the kidney could be palpated and made out to be roughened. This examination was painful. The left kidney could not be detected and there was no pain in the left iliac and lumbar regions. The urine was albuminous, the patient's general condition bad, and there was an eruption on the upper portion of the trunk. The axillary and adjacent lymphatics were enlarged, the teeth were much decayed, there was thickening in the upper part of the lips, exostosis on the right tibia, and swelling over both shins. There was a history of progressive failure

in strength, with loss of weight. The feet were often swollen. In diagnosis, chronic nephritis could be excluded, and it seems probable that the kidney had become infected with pus-forming organisms or with the tubercle bacillus, or the spirochetæ. Under the free use of iodide of potassium the patient greatly improved. He also reports a second and similar case where the right kidney could be palpated, where the secretion of urine was considerably lessened, and a well-marked percentage of albumin was present. This patient also improved under the free use of iodide of potassium.

Mangiagalli (*Arte Ostetr.*, Milano, 1912, Anno. 26, p. 217) has studied the relations between syphilis and pregnancy in their clinical aspects. He recognizes four conditions: one in which both parents are syphilitic at the time when conception occurs, a second where the mother alone is infected, a third where the father alone is syphilitic, and a fourth where the mother becomes syphilitic after conception, although both parents prior to conception were healthy. With others, he finds that the Wassermann reaction has demonstrated the fact that apparently healthy children born of syphilitic mothers are themselves syphilitic. When a mother becomes infected after the seventh month of gestation the symptoms in the fetus are much less severe. Although such a child may show no gross sign of syphilis the Wassermann reaction will be positive. There seems to be no direct relation between the positive Wassermann test and the characteristic clinical signs of syphilis. It is possible that mothers nursing syphilitic children may be immune to the child itself. When both parents are syphilitic the child is syphilitic in 68 per cent. When the mother alone is infected the child shows the characteristic infection in 60 per cent. When the father alone is syphilitic, in from 12 to 28 per cent. The length of time which elapses after the primary infection very much weakens the severity of the syphilitic process. So far as the infection goes, tertiary

cases are considered not infectious, while primary and secondary are. It is well to treat the mother when the father has syphilis, although the mother may show no clinical sign of the disease. A mother who is not syphilitic may nurse her child, as the writer believes that the mother is practically immune. He believes that the child should be directly treated, but that one should not rely upon treatment addressed to the mother only. He prefers treatment by inunction for infants to the use of any other method.

Miller (*Cleveland Medical Journal*, July, 1912) has found in his observation that most conceptions occurring in syphilitic patients terminate in abortion during the first month, and that where pregnancy goes further than this, in the great majority of cases the fetus is born macerated. Should the child escape death it will be puny and ill developed, although it may show no positive sign of syphilis. He believes that 22 per cent. of all pregnancies end in abortion, but that in syphilitic women, the percentage of abortion rises to 70. Where the infection occurred just before or during pregnancy the entire ovum, both placenta and fetus, gives abundant spirochetæ. Changes in the placenta are responsible in most cases for fetal death. In some cases the severity of the syphilitic process seems to have exhausted itself upon the placenta, the fetus showing little signs of the disease. The Wassermann reaction is not always present in patients giving birth to macerated children nor in those having repeated abortion. The mother, however, will give a positive reaction whether the fetus shows signs of the disease or not.

Engman (*Jour. Am. Med. Assn.*, May, 1912) believes that the mode of infection in mother and child is practically through the bloodvessels, the spirochetæ being usually found more abundantly in the fetal than in the maternal portion of the placenta. This may be because the growing portion of the placental connective tissue is less resistant than other portions.

Gambarow (*Nowoje w. Med.*, 1913, No. 14) among other patients to whom he applied the Abderhalden test, had two that were syphilitic. The form of specific disease was syphilitic granuloma and a positive reaction to the Abderhalden test was given.

Conradi (*Jarhb. f. Kinderheilk*, 1913, Bd. 77., p. 190–193) describes a case of umbilical sepsis where Friedländer's encapsulated bacillus was found in a child having hereditary syphilis. In the liver and spleen there were spirochetæ and in the blood from the heart and the spleen encapsulated bacilli. In the suprarenal bodies there were large dark-red areas of hemorrhage caused by the septic infection which was the immediate cause of the death of the child.

The practical question concerning the safety of marriage among syphilitic persons is discussed by Matthei (*Zentral. f. Gyn.*, 1913, Nr. 29). He would give his consent when at least five years had passed since the infection, and when for the last two or three years absolutely no symptom has been present. It is difficult to correctly estimate the virulence or lack of virulence in a syphilitic process. When the nervous system becomes involved the infection has been a severe one. Considerable value must be placed upon the reaction of the patient to antisyphilitic treatment, and the Wassermann reaction must be absolutely negative.

That syphilis may cause complications in labor, is illustrated in the case of Oue (*Bull. de la Soc. d' Obst. et de Gyn. de Paris*, 1913, 2 Année, Nr. 5). The patient was a young primipara, long in labor, and the external os only admitting one finger. The parts were becoming edematous and a spontaneous delivery was impossible. Accordingly, the mother was delivered by section, but died two days later from pulmonary embolus. Although many have denied that spirochetæ can be found in the milk of a syphilitic mother, Uhlenhut and Molzer (*Deutsche med. Wchnschr.*, 1913, p. 79) in 2 cases were able by inoculating guinea-pigs

with the milk from syphilitic women to obtain a characteristic reaction. In these cases there were no syphilitic lesions upon the nipples. One mother had no symptoms herself but had a syphilitic child. Under these circumstances it is easy to understand how an infant can become infected.

The popular belief that syphilis is a frequent cause of abortion is denied by Trinchase (*Beitr. z. Geb. u. Gyn.*, 1913, 1800-1802). He believes that when syphilitic women abort it is because they have displacements of the uterus or endometritis or some other disorder beside syphilis. He asserts that up to the present, spirochetæ have not been found in the product of conception expelled by abortion. He also believes that in the interruption of pregnancy between the fifth and seventh months, syphilis plays no important part. Two-thirds of all syphilitic children are born in the last three months of pregnancy, and of these but 5.3 per cent. are fully developed. Fetal infection usually occurs in the last months of gestation and 53.5 per cent. of stillborn syphilitic children are between the eighth and tenth months of development. Antisyphilitic treatment of the mother should begin, if possible, before the fetus has become infected; so soon indeed as a diagnosis of specific disease can be made.

SYPHILIS IN THE NEWBORN

Syphilis attacks the fetus in very different ways in different cases. The subject of maternal syphilis cannot be considered without observing many of the characteristics of the disease in the child as well, but certain symptoms are peculiar to the syphilitic infant.

Godron (*Thèse de Paris*, 1904) calls attention to sudden death in syphilitic infants many of whom have hereditary syphilis and who give no clinical symptoms. When the child does not nurse well and loses weight, even though no

characteristic symptoms of syphilis be present, one must always have it in mind and try the effect of mercury given by inunction. Such children often improve remarkably under antisyphilitic treatment.

Ribbert (*Zentralbl. f. Allge., u. pathol. Anat.*, 1905, Bd. 15) calls attentions to masses of fatty tissue with highly granular and discolored substance found in the lumen of urinary tubules and in the parotid gland of syphilitic children. These masses stand in no relation to subjacent cells and resemble protozoa whose significance is not clear.

Thomsen (*Bibl. für Laeger*, 1907, pp. 69–92), believes that the prognosis in syphilis of the newborn child depends greatly upon the prompt making of a diagnosis and speedy and efficient treatment. He lays considerable stress upon the characteristic inflammation of the umbilical cord, believing that it is present in three-fourths of all cases. In the Copenhagen Maternity Hospital he examined all children of syphilitic mothers by the *x*-ray during the first days after birth. In this manner he could detect the characteristic osteochondritis at once and institute mercurial treatment promptly. Fifty-five children were examined of whom 15 were found to be syphilitic. In 7 of these, by the *x*-ray, the characteristic osteochondritis could be plainly seen. In other cases where the bones were normal the inflammatory condition of the umbilical cord pointed to the diagnosis. He considers the examination of the umbilical cord of special importance, and also the placenta, and next to this is the use of the *x*-ray. He was unable to base the prognosis upon the extent and severity of the osteochondritis present.

Risel (*Vortrag. auf. d. Natur-Versamml. Köln, Abt. f. Kinderheilk*, 1908) examined the blood of 20 infants having hereditary syphilis, finding the hemoglobin percentage less than normal and the number of erythrocytes reduced to 1,500,000. These cells were also much altered in contour.

Except in the mildest cases the red-blood cells were enucleated with many variations. A marked leukocytosis as high as 20,000 was not often seen, but is usually present in cases complicated by septic infection or bronchopneumonia. In very severe cases a higher percentage of lymphocytes is often observed while the leukocytes may be absolutely normal. So also the mononuclear leukocytes may be increased. Where the myelocytes are markedly increased a very unfavorable prognosis may be given. The most extensive changes in the blood were seen in the youngest children studied. As these were children nursed by the mothers, the influence of nursing could not be said to be efficient for the child. Additional symptoms of syphilis were found in the swelling in the spleen and liver, and in many children in the pseudoparalysis of the extremities.

Bauer (*Jahrb. f. Kinderheilk*, 1908, p. 232) has used the Wassermann reaction to diagnosticate syphilis in the newborn and has attained positive and reliable results.

Weyl (*Jahrb. f. Kinderheilk.*,1908) has examined 6 newborn infants with hereditary syphilis, varying in age from thirteen days to four and a half months, in whom there was clinical evidence that the brain was involved, but in one of whom significant and characteristic lesions were found at autopsy. In the other cases the changes we were in the pia mater, characterized by thickening of the connective tissue with cell infiltration. In 5 fibroblasts, plasma cells, large round cells, and lymphocytes were found in abundance. Very rarely red-blood corpuscles, leukocytes, and mast cells were found. In the lining of the vessels of the pia mater and in the brain adjacent there were masses of lymphocytes and white-blood cells which seemed to be embryonal tissue. In 1 case the process present in the meninges had extended to some extent to the cortex. In only 2 cases was there extravasation of the blood in the substance of the brain itself. In 3 there seemed to be a mild

inflammatory process in the cerebral tissue. From his observations he infers that in syphilis in the newborn the brain is very frequently involved.

David (*Thèse de Toulouse*, 1909) believes that syphilis contracted after conception is much more slow in developing than that which is present when conception occurs. It can, however, attack the fetus through the medium of the blood channels and the placental circulation. Vigorous treatment of the mother is indicated at all periods of her gestation.

Boissei (*Bull. de la soc. d'obst. de Paris*, 1910, Nr. 8, p. 400), in the maternity of Saint-Louis, found that in 95 per cent. of cases where a macerated fetus was born after the fourth month that syphilis was the cause. In 2 per cent. of these cases the mother's albuminuria produced fetal death; in 3 per cent. the cause could not be ascertained.

Tissear in 115 cases could distinctly recognize syphilis as the cause of fetal death in 71. In 24 macerated fetuses where the mother was syphilitic the spirochetæ could be demonstrated in 19. In 32 cases where the mother was probably syphilitic they were found in 28. In 26 cases where the mother was suspected to have syphilis and where the fetus was macerated, syphilis was proved in 14. In 78 apparently healthy women, through examining the fetus, syphilis was detected in 38. In a series of 115 macerated fetuses, 99 were the result of syphilis.

While in the great majority of cases syphilis is acquired before birth it can occasionally be proved to have occurred during parturition itself. Haslund (*Hospitalstid.*, 1911, No. 9) reports the case of multiple recent extragenital indurations in an apparently healthy child at birth, developing in the fifth week and proved to have been syphilitic and acquired during birth.

It is interesting to know the fate of children born with hereditary syphilis. Obviously many circumstances combine

to obscure the facts in these cases. The existence of the disease may be denied or concealed, and those knowing the condition of the parents may be separated from the child and the parents themselves may have died. Bering (*Archiv f. Dermatologie*, March, 1911) has studied and followed the histories of 37 cases. The syphilis was hereditary and late. The infection had occurred before birth, but the symptoms of the hereditary disease showed themselves later in life, entirely independently of the development of the characteristic lesions soon after birth.

In these cases there was no evidence regarding syphilis in the parents; examination of the child was negative and the test by serum was also negative. The father admitted previous syphilis in 4, but in no case would the husband admit that he had infected the wife. In 27 cases the history of the mother showed abortion, stillbirth, or a diseased child, and the fact that they were infected was known to 6 of the mothers. A positive Wassermann test was present in 8 of the mothers, none of whom had any other evidence of syphilis.

Late hereditary syphilis appeared at the average age of eight, varying from the end of the first year to twenty-six years of age. Out of the 37, in 26 there were old lesions which showed that the disease then present was not the first hereditary syphilitic attack. With the exception of 4 cases, in which the Wassermann reaction could not be made, it gave a positive result in 27 of the 33 (73 per cent.)

The lesions produced by hereditary syphilis were a disease of one or both knee-joints in 16 cases, in 2 of which other joints also were involved. In 19 there were glandular swellings, in 26 parenchymatous keratitis, and lesions of the bones in 26.

Where the joints were involved there was chronic inflammation of the capsule and secondary changes in the bone and periosteum. While the bone is apparently thickened

the appearance is often caused by swelling of the joint capsule. Synovial fluid from an affected joint was tested by the Wassermann serum in 2 cases, in one with positive result. The swelling of both knee-joints was the most significant symptom present in all cases, but in 11 it was the first. The bilateral character of the swelling distinguishes it from tuberculosis. It is more rapid than tubercle; the serum gives a positive Wassermann reaction while tuberculin tests are negative.

The cervical glands were most often affected in the same manner seen in acquired syphilis. Keratitis is usually bilateral, rapid in its course, and at the last estimate is present in half of all cases. Deformities of the nose and tibia were most frequent alterations seen in the bones and in 26 cases. It was comparatively rare to find the ears affected; in but 2 cases the labyrinth was diseased and the process went quickly on to complete loss of hearing. Hutchinsonian teeth, scars on the lips, traces of papular eruption were all characteristic. In 3 children the mind was affected and 1 was melancholic. In the 37 the symptoms most usually present were bone deformities, keratitis, or swellings of the knee-joints. Syphilis of the viscera was usually absent, as there was but 1 case where the liver was involved and another in which the aorta was diseased. This is probably due to the fact that where the syphilitic infection is serious the fetus dies before birth. So far as treatment was concerned, salvarsan was used in 3; in 2 without result, while in the third, where there were large gummas, the good effect was seen more quickly than from mercury.

Hochsinger (*Ergebnisse der inneren Medicin und Kinderheilkunde*, 1910, vol. v) followed 208 children for more than four years after birth. The prognosis is worse where the child with hereditary syphilis develops lesions of the viscera, especially of the nervous system. Of the 263, 79 died, 38 before the end of the first, 15 during the second, and

27 after the second year of age. In 12 per cent. of the cases, tuberculosis was present in addition to syphilis. So far as lesions are concerned there was evident syphilitic changes in 26, 89 showed parasyphilitic changes in the nervous system; syphilitic dystrophies were present in 92, while the circulatory system was attacked by the disease in 13, and in 15 there was tuberculosis in addition.

Carle (*Ann. de Dermat. et de Syph.*, 1912, Tome iv, pp. 451–460) has found that the mother of a syphilitic child must be considered syphilitic and treated as such although the usual clinical signs of syphilis may be absent. So the child of a syphilitic mother must always be considered syphilitic, and even if this cannot be proved, it should never be regarded as immune.

Jeanselme (*Journ. de méd. de Paris*, 1913, Tome xxx, p. 199) draws attention to the necessity for caution in giving weak children who have no positive sign of disease to be nursed by healthy women. He describes a case of a healthy wet-nurse who not quite three months before coming under observation began to nurse an infant dying later of syphilis. A characteristic syphilitic lesion appeared in the areola of the left breast, the lymph glands in the left axilla were swollen and also in the carotid region and there was an indolent erythema about the mouth. The child of the wet-nurse as well as the mother later gave a positive Wassermann reaction, the infant nursing from the diseased breast.

How frequent congenital syphilis may be among the poor of a large city may be inferred by Fildes's paper (*Journal of Obstetrics and Gynecology of the British Empire*, March-May, 1915). The Wassermann test was performed upon 1000 infants at birth, taken from the poor of the East Side of London, and the test was again made upon the same infants and their mothers at a certain period after birth. Owing to the practical difficulties in applying a blood test to babies, it is not easy to use the Wassermann reaction in

congenital syphilis, and to study from that standpoint so-called latent syphilis. But the occurrence of this condition in mothers has been amply proved. It may be expected that an infant congenitally syphilitic will develop a positive Wassermann reaction in at most two months after birth, and so, in this series of cases, the test was made at birth and between two and a half and four months after birth. Fildes recognizes the fact that an infant may be infected in the uterus by spirochetæ passing through the placenta from the maternal blood, and that also the infection may occur during labor by spirochetæ in the vulvar secretions of the mother. Should the infant escape, this infection may still occur shortly after birth by spirochetæ in the mother's milk or through kissing or other contact. Infection before and at birth is properly congenital, but infection after birth through nursing should not be so described with accuracy. That an infant should become syphilitic through nursing some time after birth can scarcely be considered as a frequent occurrence.

The method of investigation was to collect blood from the umbilical cord in a test-tube from the placental end of the cut cord and send it immediately to the laboratory, while subsequently blood from mothers and babies was obtained from the thumb or great toe by Wright's capsule. Blood must be taken from the placenta instead of the body of the infant, because it is not possible to obtain sufficient from the infant's body by Wright's capsule or from the umbilical end of the cord. The placental blood was taken at birth in the houses of the patients by visiting student nurses. No reference was made to any pathological condition in mother or child. Evidently the test could not be made in early miscarriages because sufficient blood could not be obtained. Hence more or less viable infants were those investigated, and this study has no bearing upon the effect of syphilis in producing abortion. Two and a half months

after birth of the first child and from two and a half to four months after the birth of each successive baby the mothers were requested to bring their babies for inspection to the London Hospital. The mother was taken separately into a room adjacent to that where the babies were and a blood test was made. When she found that she was not harmed by this, consent was usually obtained without difficulty to make the test upon the infant. So far as could be known the infants were the children of married couples, and criminals and abandoned drunken persons were not included in the investigation. Both Jews and Christians were investigated and no special differences could be found, so far as the prevalence of syphilis was concerned, between them.

The results were rather surprising and interesting. Only one baby in 1015 showed symptoms of syphilis at birth. Among 660 infants but 3 developed syphilis proved by a positive Wassermann reaction while under observation, and of these three only one had characteristic symptoms. In 677 syphilis was proved in 4, which is a ratio of 5.9 per 1000, and of these one died and two showed no clinical symptoms. Only one child died of syphilis, while from other causes 16 perished. 3.9 per cent. of the women gave a positive Wassermann reaction but only 4 of these transmitted syphilis. Fildes believes that the Wassermann reaction obtained with blood from the placental end of the umbilical cord does not diagnose syphilis in the infant but in the mother.

THE CLINICAL MANIFESTATIONS OF CONGENITAL SYPHILIS

Armstrong (*British Medical Journal*, May 2, 1914) calls attention to the report of the Royal Commission on Venereal Diseases, which emphasizes the frequency of congenital syphilis. His observation agrees with the report of the

commission that congenital syphilis is as frequent as formerly, but less severe. At present one does not see cases of newborn infants dying shortly after birth with syphilis with extensive necrosis. The bony lesions in congenital syphilis are less frequent. On the other hand, parasyphilitic disease, such as cerebral syphilis, paralysis, and tabes, are increasing.

In the great majority of cases the Wassermann reaction has proved reliable. Luetin, proposed by Noguchi, in some cases not suspected from the clinical findings, gave a positive and accurate result. In some patients known to be syphilitic the test was negative. Such are the reports of Brown (*American Journal of Diseases of Children*, 1913, p. 171) at the Babies' Hospital in New York. Armstrong employed the von Pirquet test for congenital syphilis with a similar result. In late syphilis, where the Wassermann reaction is positive in the cerebro-spinal fluid but not in the blood serum, the luetin test is more reliable. It may be difficult to employ the Wassermann reaction with the infant, but if the mother gives a positive reaction it may be concluded that her child is syphilitic. Occasionally the infant may give the reaction and develop no symptoms subsequently. This may be explained by the absorption of substances from the placental circulation without actual infection. Marasmic infants may never give a positive Wassermann reaction, although known to be syphilitic because the toxemia present overshadows the acute syphilis. Such must not be considered true examples of congenital syphilis, and these cases are usually seen where the parent has had the disease for a long time.

But from 5 to 10 per cent. of infants born of syphilitic mothers survive the first year of life. Abortions and premature birth are exceedingly common among these women. The birth of a monstrosity may follow a series of abortions. In diagnosing syphilis in the newborn, one must avoid

error in considering what is known as pemphigus neonatorum as a genuine syphilitic eruption. It is not that, but is caused by streptococcus infection of the skin and resembles impetigo contagiosa. Occasionally a bullous syphilide is seen in a newborn child. This is always upon the palms of the hands and soles of the feet, rapidly changing to the color of raw ham. When this pemphigoid eruption develops after birth, usually on the dorsal surface of the extremities, it indicates a severe infection.

Eczema seborrhoicum may be mistaken for congenital syphilis. The usual yellow, greasy, scaly eruption in the folds of the face and on the scalp do not closely resemble syphilis. But when this condition is upon the thighs and abdomen and about the bowel and urethra, discharges retained in the diaper may so irritate tissues as to obscure the characteristic lesions. The surface is inflamed, moist, oozing, dark red in color, much resembling syphilis. The child, however, is well nourished and without lesions on the hands and feet. On other parts of the body the eruption is covered with scales.

Bosani (*Jahrb. f. Kinderheilk.*, 1914, lxviii, 177) describes 2 cases of infants with congenital syphilis having Raynaud's disease. In some cases of congenital syphilis severe gangrene of the lower extremities may develop, greatly improved by antisyphilitic treatment. In early infancy these children have condylomata and laryngitis. Laryngeal cough may be persistent and the cry may be hoarse and occasionally interstitial pneumonia complicates the condition. When the child is given potassium iodide it usually recovers rapidly. Hemoglobinuria, nephritis, and edema are also seen in children congenitally syphilitic. Basal meningitis is the most usual complication on the side of the nervous system. To make a positive diagnosis the cerebro-spinal fluid should be obtained by lumbar puncture and examined. Should the Wassermann reaction be negative, it may still be obtained

from the blood. Infants may have the characteristic symptoms of syphilis of the nervous system well developed.

Quirel (*Annales de Gynec.*, December, 1904) calls attention to the fact that the ratio existing between the weight of the fetus and placenta is normally 1 and 6. In syphilis, however, this proportion is changed to 1 and 4. The characteristic lesions of the placenta in congenital syphilis are those of endarteritis. That the syphilitic fetus is prone to sudden death is emphasized by Godron (*Thèse de Paris*, 1904). He is suspicious of all newborn infants who lose weight progressively after birth, and would treat such children by mercurial inunction.

Junghaus (*Inaug. Diss.*, Königsberg, 1904) has seen excellent results by treating the mother vigorously with mercury during pregnancy. The child may entirely escape syphilis. Pinard (*Annales de Gyn.*, 1904) agrees in this recommendation.

The responsibility which parents take who allow their children to nurse unhealthy women is emphasized very strongly by Renaut (*Thèse de Paris*, 1904).

That newborn syphilitic children may be successfully treated with hypodermic injections of bichloride solution is asserted by Salge (*Berliner klin. Wchnschr.*, 1905).

Muratow (*Zentral. f. Gyn.*, 1907, No. 27) describes uterine hemorrhage of syphilitic origin which ceased by vigorous mercurial treatment.

THE MODERN TREATMENT OF SYPHILIS

Pinard (*Annales de Gynec.*, 1905) believes in vigorous prophylaxis with mother and nursing child to protect both from syphilis. He would examine a wet-nurse with the utmost thoroughness, recognizing the fact that she may have become infected from the infant that she nursed and still herself present no evident symptom. While nursing a

second child, however, she may develop active syphilis and infect the second child. The same is true of infants with hereditary syphilis. In view of these facts, Pinard believes that women should nurse their children as a protection against syphilis under proper precautions. Where there is reason to fear it, antisyphilitic treatment during pregnancy and after labor should be carried out with all hygienic precautions, and the infant should be nursed by no one but the mother. Such a course would limit the disease and give the best results for mother and child.

Salge (*Berl. klin. Wchnschr.*, 1905) has had the best results in the treatment of hereditary syphilis by hypodermic injections. The frequency of the administration varied from once to four times weekly. The combination employed was bichloride of mercury 0.2, sodium chlorate 0.2, distilled water 10. Of this, 0.1 c.c. to be given by injection into the muscles one to four times weekly. The nasal catarrh common in syphilis is to be treated by a spray or pencilled application of nitrate of silver or mercurial ointment. Preparations of adrenalin have been useful in checking the nasal swellings and catarrh. This may be applied by tampons of cotton saturated in a 1 per cent. solution.

Gaucher (*Journ. de méd. de Paris*, September 10, 1905) believes that children apparently born healthy at full term from a syphilitic mother may be secured when the mother is treated early in pregnancy and the infection occurs before the beginning of pregnancy or when the infection occurs shortly before the end of pregnancy. He employs pills containing 0.1 of bichloride of mercury twice daily or a compound of mercury and benzoic acid in an alkaline solution, the dose, 0.02, given by deep subcutaneous injection daily. He has the best results when he alternates the pills and the injection of the solution described. Should the patient develop albuminuria the dose should be reduced one-half. Caspery (*Deutsch. med. Wchnschr.*, 1905, Nr.

24) urges that pregnant women attacked by syphilis be treated promptly and energetically. From his observation he believes that paternal syphilis is possible and that it often occurs. Schroeder would limit his mercurial treatment of syphilis in the pregnant mother if undertaken in the interest of the child to cases where there was a recent eruption. In cases of latent syphilis he uses iodide of potassium in doses as large as can be borne. Rosinski, when the mother has had one or more syphilitic children, treats the father by thorough and mixed treatment. In a series of 9 such cases the children born subsequent to such treatment were apparently healthy. Fieux and Maurice (*Ann. de gyn. et de obst.*, 1908) are convinced of the value of energetic antisyphilitic treatment of the mother in the interest of the child at all periods of gestation.

In the obstetric literature of 1911 appear papers on salvarsan in the treatment of syphilis of mother and child. Engelmann (*Zentral. f. Gyn.*, 1911, Nr. 3) treated the newborn syphilitic child by injecting salvarsan in the cubital veins. In his experience the infant has not benefited by salvarsan given to the mother, nor in the newborn can the remedy be used by subcutaneous or intramuscular injection successfully. In severe infection he has given relatively large doses, not less than 0.04 gm. by intravenous injection. and, where the disease is less severe, the dose is smaller. Even up to 0.1 gm. the remedy is well borne by full-term children. Baisch (*München. med. Wchnschr.*, 1911, Nr. 5) has found that the intravenous injection of salvarsan in the syphilitic mother who is nursing a child is not sufficient to arrest severe syphilis in her infant. The newborn child will bear salvarsan well in comparatively large doses. He has given twice to a child 0.15 to 0.3 gm. with good results. In cases of congenital syphilitic pemphigus, salvarsan has given in his hands a brilliant result. This is especially interesting, as in such a case the use of mercury by inunction

cannot be carried out. Doblin (*Berl. klin. Wchnschr.*, 1911, Nr. 12) believes that in the newborn infant salvarsan can be used in 4 out of every 6 cases. In a child dying after the injection of salvarsan, autopsy showed marked edema of the mesenteric and subcutaneous fatty tissues. He has used doses of from 0.01 to 0.02 gm. successfully. Peiser (*Berl. klin. Wchnschr.*, 1911, Nr. 1) has treated two newborn syphilitic children by giving the mother injections of sophol. This remedy seemed to have no direct effect upon the mother, but did not disturb her health. Soon after the giving of the remedy the children grew better and the syphilitic process seemed to subside for a short time. Afterward a secondary infection proved fatal. He is skeptical regarding the value of salvarsan and sophol administered to a nursing mother in influencing her child. Baisch (*Monatschr. f. Geburtsh. u. Gyn.*, 1911, Bd. 34, Heft 3) treated 3 pregnant women with full doses of salvarsan which were well borne and which seemed to produce an excellent result upon the infant. He believes in combining this treatment with the administration of mercury. In spite of the treatment, one child gave a positive Wassermann reaction. Bar (*Bull. de la Soc. d'obst. de Paris*, 1911, Nr. 2) has used salvarsan by intravenous injection in pregnant women with good results, especially in the prompt disappearance of skin lesions. He saw no especially severe reaction. In one case there was pronounced albuminuria from which the child perished during the pregnancy. He believes it impossible to ascribe this to the salvarsan, as, in this case, the placenta showed the characteristic infarcts so often present in albuminuria. Injections of salvarsan in the mother did not seem to prevent the rapid development of syphilitic phenomena in children nursed by the mother. Two children died during treatment and one mother died three days after confinement of pneumonia. He treated in all four mothers. Balaban (*Russ. Kongr. f. Geburtsh. u. Gyn.*, St. Peters-

burg, December 16–18, 1911) gives his results in the treatment of syphilitic pregnant women. In severe cases he has employed salvarsan successfully, but in the more chronic cases he prefers the mercurial treatment. Artom di Sant 'Agnese (*Soc. Lanc. degli ospedali di Roma Lueglio*, 1911) reports 4 cases of pregnant women having syphilis successfully treated by salvarsan. Girault and Tissier (*Bull. de la Soc. d'obst. de Paris*, 1911, Nr. 2) report the case of a primipara, aged twenty-two years, six months pregnant, and having an extensive and especially well-marked syphilitic roseola. Salvarsan by intravenous and intramuscular injection was given three times in doses varying from 0.03 to 0.04 gm. The result of this treatment was the disappearance of the mother's syphilitic symptoms, but the death of the fetus followed. This occurred thirty-four days after the last injection, and, as salvarsan is excreted in a few days, it is not thought that this remedy produced fetal death. Spirochetæ could not be found in the fetal body. Salmon (*Soc. de l'intern. des hôp. de Paris*, February 23, 1911) has seen no bad results in the treatment of pregnant syphilitic women by injections of salvarsan. Jaennin (*Soc. de l'intern. des hôp. de Paris*, February 23, 1911) found that salvarsan influenced syphilis in pregnant patients favorably for the patient; that the course of pregnancy was not interrupted, and that very rarely could the death of the fetus be ascribed to the remedy, as hereditary syphilis could not be excluded as a cause of death. In the newborn he did not have especially good results with the intramuscular injection of salvarsan, and believes that mercurial injections in these cases are more efficient. Langes (*Med. klin.*, 1911, Nr. 20) used salvarsan in both pregnant and puerperal patients with good results. He believes it essential to employ treatment promptly so soon as a suspicion of syphilis arises and found that the treatment gave a good prognosis for the child. If the patient obtains no treatment during preg-

nancy it should begin as soon as possible after delivery. Treatment of the mother alone influences favorably the nursing child. Syphilitic mothers should nurse all of their children themselves to avoid the spread of the disease. Langes is not decided regarding the question as to whether in children with active and florid syphilis treatment should be limited to the nursing mother or whether in such cases the child should not be directly treated. He believes that the doctrine of latent syphilis in the mother renders valueless Colles's law. He administered salvarsan by intravenous injection. Tschlenow (*Prakt. Wratsch.*, 1911, No. 12) reports the case of a pregnant woman infected by syphilis in the fourth and fifth months of gestation. Salvarsan was administered in full doses. The patient went to term and was delivered of apparently healthy children. The placenta was normal, containing no spirochetæ, and in the puerperal period the mother gave a negative reaction to the Wassermann test. Baisch (*München. med. Wchnschr.*, 1911, Nr. 5) has found that it is not sufficient to treat the syphilitic nursing mother by salvarsan to cure severe syphilitic infection in her child. In a case of severe syphilitic pemphigus in a nursing infant, two injections of 0.15 gm. salvarsan were necessary to arrest the disease, the child finally making a good recovery.

Aschheim (*Zentral. f. Gyn.*, 1911, No. 31) has been disappointed in his effort to control syphilis in the nursing child by treatment addressed to its mother only. He has found it necessary to treat the child as well. Jaeger (*Frauenarzt*, 1911, Heft 3) reports the case of a woman pregnant during the latter period of gestation, and a syphilitic, who was treated by salvarsan. The death of the fetus followed immedately after the treatment with the development of premature labor.

In 1911 Gottheil, of New York (*Progressive Medicine*, 1911), had employed salvarsan in men and women, although he

does not mention that among the women were those who were pregnant. He had used the remedy with minute observation of its results, and concludes that it does not cure syphilis, but that with mercury and iodine it is a symptomatic remedy of undoubted efficiency. It should not replace the mercury and iodine treatment, but in suitable cases should be used with them. Caution is necessary in giving it, because its action is not well known upon the kidneys, optic nerves, and some internal organs. It cannot safely be given in office practice. The patient should be carefully examined before it is administered and remain under observation and in bed for several days afterward. It is most successful in early syphilis where the contagious manifestations are appearing in rapid succession in spite of mercurial treatment. Where it is necessary to limit the production of infective material or cause the symptoms to disappear as soon as possible the remedy is of decided value. In cases where mercury does not produce a good effect or fails to control the disease, salvarsan may be used. In patients who are mentally obsessed concerning syphilis, its effect upon the mind and the method of administration is good. In very early cases of syphilis before organic changes have occurred it is unquestionably useful.

When, however, cases are doing well under mercury and iodine or when there are serious lesions in the eyes, kidneys, heart, or other internal organs, or in cases where there is disease of the internal organs following or developing late in syphilis the remedy should not be employed.

Levis (*Jour. Am. Med. Assn.*, August 24, 1912) describes the case of a woman, aged thirty years, who had passed through two normal pregnancies, giving birth to healthy children. In the fourth month of her third pregnancy her husband became syphilitic. In the eighth month the patient received 0.6 gm. salvarsan, and this dose was repeated three weeks later. On the day following the last injection the

patient gave birth to healthy twins who showed no signs of syphilis six weeks after birth.

Girauld and Tissier (*Bull. de la Soc. d'Obst. et de Gyn. de Paris*, 1912, Nr. 3) report a group of 4 cases of pregnant women treated by salvarsan. The first was a primipara who on the sixth month was given 1 gm. of salvarsan during a period of eight days. Thirty-four days after the last injection fetal heart sounds could not be heard and two weeks later a dead fetus was born. His second case was that of a multipara, aged twenty-two years, who sixteen months before her last pregnancy acquired syphilis, and was treated with bichloride of mercury by injection and in pill form. In a period of two weeks during her pregnancy she received 1.10 gm. salvarsan. She went to term and gave birth to a living child giving a negative Wassermann reaction and six months after birth this child showed no signs of syphilis. The third case was aged eighteen years, with well-marked symptoms of secondary syphilis, and received 0.8 gm. salvarsan, which caused the syphilitic eruption to disappear. Three months later there were signs of syphilis and the patient received 0.13 gm. by intravenous injection. Two months later it was found that the patient was three and a half months advanced in pregnancy and the Wassermann reaction was positive. In three months during the middle of her pregnancy the patient received 2.55 gm. salvarsan and the Wassermann reaction was negative. At the end of the ninth month a living child was born, weighing 2880 gm. and giving a positive Wassermann reaction. The child died of general atrophy six weeks after birth and no spirochetæ were found in its organs. Their fourth case was that of a young woman who acquired syphilis eight months before becoming pregnant, and in all took 2.80 gm. salvarsan. At the beginning of the pregnancy there was no sign of syphilis, and she had an injection of 0.9 gm. salvarsan. She went to term and gave birth to a living child, which continued

to increase in weight so long as the patient was under observation. The Wassermann reaction was negative.

Jaenselme (*La Presse méd.*, 1912, Nr. 103) had under observation fourteen patients with secondary syphilis and in various periods of pregnancy. All of them gave birth to living children which eight days after were in fairly good condition. Four died of some other disorder than syphilis. Two of these syphilitic mothers gave a history of illness sometime previously, had premature births, or gave birth to dead children, but after treatment by salvarsan produced living children. The writer concludes that treatment by salvarsan is superior to mercurial or mixed treatment, and that while the mothers may not go to full term they frequently give birth to living children.

Oui (*Bull. de la soc. d'obst. de Paris*, 1911, No. 9) describes the case of a patient who had a broad condyloma on the vulva and who was treated by the injection of 0.04 gm. salvarsan ten days before labor. The patient went to full term. Mother and child six months afterward showed no signs of syphilis. He also describes the case of a woman in her third pregnancy who had borne two healthy children by a healthy husband. In the ninth month of the third pregnancy she received 0.04 gm. salvarsan because she had become infected at the beginning of the pregnancy by using the same dishes that had been used by a syphilitic person. Her husband also had become infected. At the end of this pregnancy she gave birth to a healthy child weighing 4380 gm. Six weeks after labor she received a second injection of salvarsan, and eight months afterward the mother was healthy, and fourteen months later the child. Apparently salvarsan injected just before labor produces no ill effect.

Pamard (*La Presse méd.*, 1912, Nr. 23) had opportunity to observe 4 cases for a considerable time. 3 of these mothers had given birth to syphilitic children without themselves showing manifestations of the disease. After receiving

mercurial treatment they gave birth to healthy children. Pamard concludes that the mucous membrane of the uterus had become infected, but that the mothers had escaped constitutional infection, although the husband showed definite signs of the disease. The success of the mercurial treatment did not seem to contra-indicate that of salvarsan. In discussing this paper, Pamard believes that syphilis is much oftener conveyed by the father than the mother to the offspring. He cites an instance in which a woman had given birth to two healthy children by a healthy husband, and subsequently marrying a syphilitic man had two abortions, and making a third marriage with a healthy husband again gave birth to two healthy children.

Balzer did not believe that women give birth to syphilitic children without themselves becoming infected, although the disease may not manifest itself until late. Bar had frequently seen women who had given birth to syphilitic children by syphilitic men having mucous plaques or chancres and even symptoms of late syphilis without contagious manifestations. He has seen a woman give birth to a syphilitic child containing spirochetæ who herself had no signs of syphilis and gave a negative Wassermann reaction. Even where the mother was syphilitic the Wassermann reaction of the fetus is often much more positive than in the mother. This raises the question whether the mother does not become passively immune. Again, Bar raised the question as to whether the Wassermann test did not behave differently at different times. He would diagnose a passively immune condition when a positive Wassermann reaction, although comparatively mild, followed a negative reaction. Such is often seen after treatment with salvarsan.

Pausut (*Revue mens. de gyn. et d'obst. de Paris*, 1912, Nr. 6) describes the case of a young woman who became impregnated by a syphilitic man. She herself was not syphilitic but gave birth to a macerated syphilitic child.

She later married a healthy man and gave birth to a healthy child, and a year later to a second child apparently healthy. Making a third marriage, later she again acquired syphilis. This case demonstrates that a syphilitic man may produce syphilitic children while the mother remains uninfected, and that a healthy mother may give birth to syphilitic children without herself becoming infected.

Sbilinsky (*Wratsch. Gaz.*, 1912, Nr. 27) gave a patient in early pregnancy an injection of salvarsan which was followed two hours afterward by uterine contractions and two hours later hemorrhage with abortion. Yahulo (*Gaz. méd. d'Orient.*, 1912, Tome lvii, Nr. 4) describes the case of a syphilitic woman, aged twenty-five years, six and a half months pregnant, who was given an intravenous injection of 0.4 gm. salvarsan. Three hours later she had a chill, unusual palpitation, and a fever reaching 103.5° F., which soon subsided but returned again three days later. She had headache which increased in severity and became unconscious, and on the following day coma developed with no reaction of the pupils, paralysis of the extremities, sphincters, stertorous breathing, and fever. The clinical picture was that of cerebral apoplexy. On the next day Cheyne-Stokes breathing developed, the pulse became small and running (120), the temperature rose to 104.5° F., and the patient was cyanotic, but the urine contained no albumin. 200 gm. of blood was taken from the patient, but this produced no improvement, and she died.

Lameland and Brisson (*La Presse méd.*, 1912, Nr. 97) have observed after injecting salvarsan that the patient's temperature rises somewhat, the pulse becomes more rapid, there is a slight chilly sensation, and often nausea and vomiting. Pulse tension is influenced differently in different cases, the red-blood corpuscles are increased and also the quantity of hemoglobin. About one hour after the injection, arsenic can be detected in the excreta and the remedy is

speedily discharged from the body. Its effect upon syphilitic lesions is very rapid; the spirochetæ are rapidly destroyed and the Wassermann reaction in most cases becomes negative, rarely positive, and even increased in intensity. So far as he could observe the injection of salvarsan has no effect upon labor or the puerperal period. The condition of the children is always improved and they grow and develop much better. He observed no special complications for mother or child and very seldom a return of the syphilitic process. Bar in discussing this paper warned against the dangers of injecting salvarsan as he had observed a fatal case. In using the remedy it is necessary to examine the urine carefully, and should the excretion of arsenic become greatly delayed the condition is a dangerous one. Salvarsan is not universally successful and seems to predispose to the late appearance of disorders of the nervous system. The syphilitic lesions in the children disappear very rapidly, but the children not infrequently die, not from arsenical poisoning but through toxins produced by the destruction of the spirochetæ. In Bar's opinion salvarsan is a very efficacious but dangerous remedy.

Auderbert and Berny (*Bull. de la soc. d'obst. et de gyn. de Paris*, 1912, Nr. 9) treated seven pregnant patients with salvarsan. After a few days the definite lesions of syphilis disappeared but there were traces of the primary lesions and mucous plaques. They thought that the remedy acted more rapidly than mercury. In one case mucous plaques appeared one month after the use of salvarsan, and just as a new course of salvarsan was begun. Among the seven mothers there was but one case of abortion, four children were born at the natural end of gestation, weighing from 3000 to 3650 gm., and these children left the hospital without symptoms of syphilis and in good condition. One child died three weeks after birth without showing definite lesions of syphilis. In two cases the pregnancy was prematurely interrupted;

in one at the eighth month with a living child weighing 2407 gm. which did badly after birth (as the mother received but one injection of salvarsan and no mercurial treatment afterward). In the second case pregnancy was interrupted at six months, the child weighed 2000 gm., and died. This mother after four months received two injections of salvarsan but no mercurial treatment. These cases would seem to indicate that patients treated by salvarsan only frequently do not go to full term. So far as could be observed the placentæ were normal in their proportions to the fetus in these cases. The patients bore the injections of salvarsan well and the remedy seemed to produce the rapid development of scar tissue in syphilitic lesions and to hinder the development of intestinal lesions and check those already in process of growth. The writers think that the best result is obtained by the combined use of salvarsan followed by mercury.

Bar (*Bull. de la soc. d'Obst. et de Gyn., July,* 1912) reports 6 cases treated by salvarsan for syphilitic infection. All of them had florid syphilis; 3 were pregnant and 3 had been confined. Neosalvarsan had a very decided influence upon the florid lesions of syphilis, and speedily caused the disappearance of the spirochetæ. In large doses it produced a prompt disappearance of the Wassermann reaction, and in cases where the syphilitic process was in the stage of development, as indicated by the Wassermann reaction, neosalvarsan acted energetically, rapidly, and oftentimes in so various a manner as to make difficult a definite conclusion. In one case, after two injections, death followed after a few days. From his observation, Bar concludes that neosalvarsan is dangerous in full doses in parturient women and should be given only in small doses. Excretion of arsenic in the urine should be carefully watched as a safeguard. Arsenic should be quickly and abundantly excreted and a second injection should not be made if the first delays in passing out of the body. Bar also treated two infants with

neosalvarsan, in one of whom blood taken from the umbilical cord had given a positive reaction. This child was born with pemphigus, and three hours after its birth received 0.01 gm. salvarsan, and on the second day after birth the vesicles of pemphigus disappeared. The second injection was given on the third day. The child developed melena and died on the ninth day with bloody bowel movements. A second child had well-marked hydrocephalus. Its mother had a positive Wassermann reaction, the child a negative, and salvarsan produced some improvement.

v'Scily (*Wiener med. Wchnschr.*, 1912, Nr. 49) had a series of 10 pregnant patients, some of whom had repeatedly aborted, and who showed a positive Wassermann reaction, whom he treated with one intravenous injection of 0.6 gm. salvarsan or 0.9 gm. neosalvarsan, with the result that all of them gave birth to healthy children. Since that time the patients have reported at regular intervals at the hospital for prophylactic injections of salvarsan.

Bonnet-Laborderie (*Bull. de la soc. d'obst. et de gyn. de Paris*, November 8, 1912) has investigated the sudden deaths of newborn syphilitic children and ascribes it to a condition which he terms glandular splanchnomegaly, by which is meant enlargement of the glands in the abdominal cavity, as the liver, spleen, kidneys, and suprarenal capsules. In most cases of a syphilitic fetus there is considerable ascitic fluid in the abdomen. As a consequence of this condition the diaphragm is pushed upward and the expansion of the lungs is rendered almost impossible. Respiration is cut off and carbon dioxide poisoning ensues. The lungs show atelactasis, the stomach is empty, containing no gas, showing that the child has swallowed nothing and made but feeble efforts at respiration. It is questionable whether any method of treatment can influence this condition, although Sfamany urges that the abdomen be tapped and fluid allowed to escape.

Fabre and Berot (*La Presse méd.*, 1912, Nr. 97), in a series of cases of syphilitic women who showed no well-marked lesion of active syphilis, found treatment by salvarsan so dangerous that they were not disposed to give up mercurial treatment in these cases. When, however, the patients did not yield readily to mercurial treatment, salvarsan may be tried, especially in the early months of pregnancy and where there is difficulty in carrying out the mercurial course. Where patients in pregnancy show positive signs of syphilis and the disease is developing actively, salvarsan may give a better result, producing usually the prompt disappearance of primary lesions and seeming to hinder the development of syphilitic changes in the body of the child. A larger dose than 0.3 gm. should not be given as the effect upon the fetus may be disastrous. If good judgment be used in employing the remedy it will frequently enable the syphilitic woman to go to full term in pregnancy.

Sauvage (*La Presse méd.*, 1912, Nr. 97) gives his results in the treatment of 130 pregnant syphilitic patients with salvarsan. A very mild albuminuria developing in from three to ten days after the injection was usually observed with increase in the quantity of urates, an evidence of increased urinary formation in the kidneys. In most of these patients there was a rise of temperature, headache, vomiting, increase of rapidity in pulse sometimes approaching arrhythmia, all of which soon disappeared. Gaucher had the opportunity of observing a fatal case. Bar had a fatal case dying from cerebral hemorrhage. The remedy should, as a rule, be limited to those cases in which mercurial treatment does not agree or seems inefficient. The unfavorable symptoms produced by salvarsan are those of arsenical poisoning, to which is sometimes added a toxemia produced in the rapid destruction of spirochetæ. Arsenic can be detected in the urine in from twelve to twenty hours after the administration of the remedy. Blood-pressure is somewhat raised,

and this should make one cautious in giving the remedy to pregnant women who already have increased pulse tension. There can be no question of the fact that salvarsan rapidly destroys spirochetæ. Its influence upon the Wassermann reaction varies greatly and occasionally it has no influence whatever. The child gives more frequently a positive reaction than the mother, and arsenic certainly passes from mother to child. Salvarsan has no unfavorable influence upon the continuance of the pregnancy, and in 84 cases there were but 3 in which the remedy seemed to hasten the termination of pregnancy. In the remainder the mother's general health during pregnancy was improved. Out of 84 cases 38 came into labor at the natural extreme limit of pregnancy; 32 in the ninth; 2 in the eighth; and 2 in the seventh. Initial lesions of syphilis, sclerosis, plaques, and other alterations in the tissues, disappeared very rapidly, but can reappear during pregnancy or in the puerperal period. The fetus is very susceptible to the action of salvarsan, and soon after the injection one can detect the fact that the fetal heart sounds are prolonged and weaker than formerly. Of 91 children, 84 (92.3 per cent.) were born living, and in 73 cases the syphilis had apparently been contracted during pregnancy and threatened the fetal life. In general the children born after this treatment seemed to be better developed, and more than half of them weighed over 3000 gm., and but one-seventh of the number weighed less than 2000 gm. Of 84 children 77 showed no positive sign of syphilis after birth; 18 were found healthy some months after; 5 showed signs of syphilis and 4 died.

An interesting comparison is found in the statistics of Pinard, Champetier de Ribes, Boissard and Patocki in the treatment of syphilis by mercury. Their cases numbered 217. In 133 (61 per cent.) treatment with mercury or iodide of potassium did not cause the primary lesions to disappear. In 74.54 per cent. the child was stillborn or died soon after

birth, and in 10.58 per cent. living children were born with signs of syphilis. Where the infection is a very recent one, salvarsan undoubtedly acts more promptly than mercury. 163 cases are reported where the syphilis had produced no apparent lesions before pregnancy, and where there had been before the birth of the child no regular and vigorous treatment. There were born 66.25 per cent. of living children without signs of syphilis in the first days of life; 14.72 per cent. where syphilis was acquired during labor or in the first days after birth, and in 19 per cent. there was a macerated fetus or an abortion. A third group of 128 cases contained 12 syphilitic women, who gave no positive sign of syphilis during pregnancy, who had received treatment before conception and regularly during pregnancy. Among these there were 88.28 per cent. of children born living. The results of the study of these cases seems to indicate that mercurial treatment when employed late in the history of the disease does not produce a good result, and that this remedy is most successful immediately after the infection or for some time before conception or during the entire period of gestation. Salvarsan is most useful when during pregnancy symptoms of recent syphilis develop vigorously, and then the remedy acts promptly and efficiently. The percentage of living children obtained by salvarsan treatment is stated to be 92, while in mercurial treatment but 74.64 per cent. are essentially benefited. Evidently one cannot abandon mercurial treatment. If it is feared that a patient will not bear salvarsan well, one can always try Fowler's solution in small doses until the patient becomes accustomed to it. Where syphilis is suspected it seems best to use salvarsan as soon as possible after the beginning of pregnancy to prevent the spirochetæ causing severe visceral lesions.

Trillat (*Bull. de la soc. d'obst. et de gyn. de Paris*, November 8, 1912) describes the case of a woman suffering from per-

nicious anemia who had been treated by an intravenous injection of salvarsan and who died during the first stage of labor. It seemed as if the salvarsan injection had contributed to the fatal shock preceding her death.

Engelmann (*Zentral. f. Gyn.*, 1912, No. 3), in treating newborn infants severely infected with syphilis, gave as an average dose of salvarsan not less than 0.04 gm. In 6 cases of congenital syphilis he had excellent results from this treatment. Köhler (*Zentral. f. Gyn.*, 1912, No. 50), in a case of puerperal septic infection caused by the colon bacillus, gave injections of salvarsan without result.

It is interesting to know what has been ascertained concerning the local effects and ultimate fate of salvarsan in the body. Gottheil (*Progressive Medicine*, 1912, p. 137) has found that in a few hours, or at most a few days, arsenic poured into the general circulation by intravenous injection disappears from the urine. Thus the therapeutic results and the poisonous symptoms appear rapidly. That there may be later effects is possible, but these have not been accurately ascertained.

Lovejoy (*Journal of Cutaneous Diseases*, July, 1911) found local necrosis at the site of injection. Where the remedy was in suspension, large, persistent, and painful areas of induration were observed when salvarsan was given by intramuscular injection. Some of these sloughed or had been excised, the entire mass being black and dry, and necrosis occurring. Four months after injection Lovejoy found granules of the remedy in the indurated base of an ulcer. The bloodvessels and lymphatics were filled and blocked with granules of the substance and the vessel walls thinned and degenerated. There was no evidence of inflammatory reaction, but the remedy had acted purely as a foreign body.

Scholtz and Salzberger (*Archiv f. Dermatologie*, April, 1911) examined the tissues after salvarsan had been injected

in various media. In all cases there was marked necrosis twenty-four hours after the injection. Muscles, nerves, vessels, and all of the tissues were involved. The salvarsan was completely cut off from the circulation by thrombosis of the vessels at the site of injection. As late as four weeks after large amounts remained in the tissues. Evidently but a small portion of the substance when injected into the muscles is absorbed during the first few days or weeks after the injection. By intramuscular injection the substance behaves much as mercury does when given in the same manner.

Ullmann and Haudek (*Archiv f. Dermatologie*, April, 1911) examined the tissues after the injection of salvarsan into the muscles by the *x*-ray and could demonstrate the metallic infiltrate weeks after its administration.

Tryb (*Monatsheft f. praktische dermatologie*, April 15, 1911) examined histologically the tissues in cases where the remedy was given by subcutaneous and intramuscular injection. The fibrillæ of the muscle bundles had undergone degeneration far beyond the necrotic area, where portions of the drug remained. Surrounding this a dense mass of connective tissue was found, showing that the whole had become encapsulated.

Chambrelent (*Arch. mens. d'obst. et de gyn.*, 1913, Tome ii) had used salvarsan with good results in the syphilis of the newborn, adjusting the dose from 10 to 15 mg. to the kilogram of body weight. Levy-Bing and Durveux (*L'enfance*, 1913, Tome i) are opposed to the use of iodide of potassium or salvarsan in the treatment of syphilis in the newborn. They believe that the syphilitic infant should nurse the mother or a syphilitic wet-nurse, and that mercurial treatment by inunctions of grey ointment or subcutaneous injections of the soluble productions of mercury constitute the only efficient treatment. They have abandoned salvarsan, iodide of potassium, calomel by the mouth, and subli-

mate baths. Simpson and Thatcher (*British Med. Jour.*, 1914, No. 2748) give results obtained in 40 cases of children treated by salvarsan given intravenously. The dose was 0.01 gm. for each kilogram of body weight. There were seven deaths in the series.

Jaenselme (*Ann. de gyn. et d'obst.*, 1913, Tome xl) has treated syphilitic pregnant women by injections of salvarsan administered at intervals of eight days. In all these patients received five or six injections. The first comprised the smallest dose, 0.2 to 0.3 mg. salvarsan, because the reaction following the first injection is sometimes severe. Later the dose was increased to 0.3 to 0.4 gm. intravenously given. With special care in observing the secretion of salvarsan by the kidneys the results obtained were exceedingly good.

Sauvage (*Ann. de gyn. et d'obst.*, 1913, 40, Series 2, and *Congres. de la soc. obst. de France*, 1912) has found that florid syphilis during pregnancy calls for the use of salvarsan. In cases of latent syphilis, or those in which previous treatment has not been successful, salvarsan may also be used. Where syphilis resists salvarsan, mercury should be employed.

Congenital syphilis is a subject of great importance in view of the necessity and reasons for preserving infantile life. Leonard and Findlay and Robertson (*Glasgow Medical Journal*, 1915, No. 83, p. 330) give their results during the last two years by various methods. Some were treated by inunctions of mercury and, where the child was breast fed, by giving potassium iodide and bichloride of mercury to the mother. The results were far from satisfactory and, in the experience of the writers, in 18 cases the general mortality was 66 per cent., while for children under three months it rose to 71 per cent.

When salvarsan was employed by intramuscular injections and mercurial inunction was also practised the results

were somewhat better; but this treatment had to be abandoned, because of its great pain and the necrosis and sloughing which frequently followed. Forty-three cases were treated with neosalvarsan by intravenous injection and with inunction of mercury. The veins of the scalp were selected for the injections in the younger children while the external jugular was employed for older children. The solutions were concentrated, 0.05 to 0.3 gm. to 3 or 5 c.c. normal salt solution. Of these patients 22 were under three months and, including all cases dying within a year after the last treatment, the mortality was 45 per cent. In 7 cases antenatal treatment was employed. This consisted in giving to pregnant women neosalvarsan by intravenous injection and mercury by inunction. Good results followed; clinical signs of syphilis being absent in the children at birth and subsequently, while the Wassermann reactions were negative. In no case was pregnancy interrupted. It was thought that the fact that the disease was located in the uterus accounted for the absence in the mothers of syphilitic children of clinical manifestations. If treatment be delayed until after the birth of the child, although it be prompt and vigorous, the mortality remains high. So antenatal treatment is especially important, and for this salvarsan seems well adapted. The experience of the writer, and the reports of Sauvage having 93 per cent. recoveries, and Bourret and Fabre with 100 per cent. recoveries, indicate the success of this method. To carry it out properly some form of notification is required, and syphilis should be added to the list of notifiable diseases. Could this be accomplished, unquestionably the number of cases might be very much reduced by well-selected treatment.

Meyer (*Zeitschr. f. Geburtshülfe und Gynäkologie*, 1915, Band 77, Heft 1), publishes the results of his clinical and experimental studies upon the effect of salvarsan on congenital syphilis in the infant through the medium of treating the

mother. These observations were made, so far as their clinical aspect was concerned, in Walthard's wards in the Frankfort Frauenklinik, while much of the work in chemistry was done in Ehrlich's Institute. The writers found that the placenta contained a considerable quantity of arsenic, which may be taken to represent that of the maternal blood which circulates through the placenta. A perfectly healthy placenta, not the site of disease, does not permit the passage of arsenic. In syphilitic disease of the placenta arsenic is transmitted through the placenta. For this one cannot assign any definite cause nor can one state with what frequency arsenic thus passes. Evidently the result of the treatment of congenital syphilis in the child by means of salvarsan is practically the result obtained upon the mother by the use of this remedy. Probably the effect is prophylactic and seems to limit the transmission of the disease through the placenta. Salvarsan given to pregnant women is well borne. By the method of intravenous transfusion neither hemorrhage nor abortion occurred. In no case did the fetus perish *in utero* as a result of the treatment.

Especially gratifying success was obtained by combining the salvarsan with the use of mercury. Thus in 37 pregnant women treated by this method 97.4 per cent. gave birth to living children. In 43 women treated during pregnancy with salvarsan and mercury 86 per cent. of their children remained alive after the first ten days. Of the children born of these mothers 15.8 per cent. gave a positive Wassermann reaction.

If one desires in all stages of maternal syphilis to secure a living healthy child at the termination of pregnancy, one must push the treatment by salvarsan in increasing doses. Perhaps the smallest dose which will produce a therapeutic effect is 1.5 gm. salvarsan with 0.5 gm. salcylate of mercury. Very rarely can one obtain a healthy child with a smaller dosage than this. The children of syphilitic mothers should

be treated with salvarsan after birth independently of the appearance of clinical or other signs of syphilis, until one is absolutely sure that the disease is eradicated.

Salvarsan has obtained some measure of success in the treatment of diseases caused by parasites other than the spirochetæ. So in practical doses it has sometimes proved useful.

Bleymie (*Revue mens. de gyn. d'obst.*, 1913, vol. vii, No. 3) has employed this remedy in cases of puerperal septic infection, giving 30 cg. by intravenous injection. He reports a favorable influence on the temperature, pulse, and general condition of the patient.

That the extensive use of salvarsan in controlling syphilis must greatly reduce the frequency of abortion is evident from Bab's report (*Zentralb. f. Gyn.*, 1907, No. 27). He reports a case in which the woman's first conception came from a perfectly healthy man. Four months after this she contracted syphilis and four weeks before labor enlargement of the lymphatic glands developed. At the eighth month she gave birth to a macerated fetus containing spirochetæ. This case shows that syphilis acquired during pregnancy may be conveyed to a healthy embryo or fetus.

In treating these cases, Bab has found that the employment of mercury may result in the absence of spirochetæ in the fetus. He believes that this should invariably be combined with the use of iodide of potassium, so that the fetus perishes from intoxication rather than from the infection. In some cases the poisoned material remains in the placenta alone and the child becomes diseased through rupture or leakage of the placental vessels. There is an interesting contrast between the absence of spirochetæ in the placenta and maternal cord and their presence in abundance in the body of the fetus. They are found in abundance immediately behind the umbilical ring in the fetal umbilical arteries and umbilical vein. This fact points

conclusively to the placental method of infection. In some cases some of the spirochetæ unquestionably pass into the fetal body. In cases where none are found in the fetal liver, while the other organs contain them, one must admit the possibility of ovogenous development of syphilis, in view of the fact that the fetus *in utero* may inspire infected amniotic liquid.

In addition to the use of salvarsan, Brodfeld (*Med. Klinik*, 1915, No. 16) has had good results in the treatment of syphilis by using embarin, a mercurial preparation. This substance is employed in a solution containing 3 per cent. of a compound of mercury, salycylic acid, and sulphuric acid with 0.5 per cent. acoin as an agent to prevent pain. Injections of from 1.3 c.c. were given in the gluteal region fifteen times daily every second day. The results were excellent; the injections were not painful and there were no secondary results of a disagreeable sort. After the treatment the Wassermann reaction was negative.

Klemperer (*Therapie der Gegenwart*, 1915, Heft 3) has employed iodide of sodium by intravenous injection in the treatment of syphilis with good results. He has given from 5 to 20 gm. in 10 per cent. solution every two or three days. In some cases the dose was even greater. The injections were painless and very rarely produced disturbance. The method of treatment seems especially valuable and indicated rare syphilitic lesions of the internal organs and the nervous system.

It is possible by this method to procure a negative result from the Wassermann test. In many cases, however, Klemperer combined salvarsan and mercury. He found that treatment with iodide seemed to increase the efficiency of the salvarsan treatment. In syphilitic lesions of the aorta small doses of salvarsan with large doses of iodide gave especially good results.

Baginsky (*Therapie der Gegenwart*, 1915, Heft 1 and 2)

has observed that the treatment of hereditary syphilis is greatly influenced by the fact that, because of their deficient power of resistence, these children frequently suffer from bronchitis and bronchial pneumonia, diarrhea, and other complications. The streptococci find especially favorable soil in syphilitic tissue.

Many children who have hereditary syphilis show at first no signs of the disease, and weeks or even months may pass before the disorder breaks out. The treatment must vary in accordance with the organs involved and the condition of the patient, but should have for its aim the one point of limiting the activity of the syphilitic process as promptly and completely as possible. Hereditary syphilis is one of the most active and virulent of diseases. While it is claimed that cases occasionally recover spontaneously, the form of syphilis present is such as to lead to the belief that the disease had been latent for some time.

In treating congenital syphilis, Baginsky believes that one should not suspend treatment until the Wassermann reaction is absolutely negative on repeated examination, remembering that in children this reaction often varies more greatly than in adults. If he should find children apparently perfectly recovered but still giving positive reaction, he would detain such cases under observation.

As to the method of treatment, he prefers external application. Intravenous injections should only be used with children when absolutely necessary and internal administration of remedies when there is some good reason why the external method cannot be used. Mercury, iodide, and arsenic can be given in increasing doses and are borne quite as well by children as by adults. Such children should be nursed through infancy by the mother, as the results of artificial feeding are not good in these cases.

In children he has found the best method of using mercury to be the sublimate bath. As a rule, thirty baths each of

10 liters of water with 0.5 to 0.10 gm. bichloride of mercury will be required. Where there are extensive lesions of the skin this method is contra-indicated. Where the skin is unbroken and sound the method by inunction may not be as convenient, but can be carried out to great advantage. In accordance with the age, 0.5 to 0.2 gm. of mercurial ointment may be employed.

The cure usually occupies from four to eight weeks or even more. Where there are skin lesions 0.5 per cent. sublimate alcohol may be injected or mercurial plasters used. Sublimate injections 0.002 to 0.006 gm., in accordance with the age of the child, may also be employed. One must watch for the appearance of albumin in the urine or for diarrhea. In some cases one may prefer to use remedies by internal administration. With most children, calomel is not well borne. Protoiodide of mercury in doses of 5 mg. twice daily are useful, and in older children the quantity may be increased to 1 cg. Iodide of potassium or iodide of sodium is with children far more successful than any other remedy, and especially in combination with mercury. So far as the treatment with neosalvarsan is concerned, one must use this drug with children with great caution. The younger the child the more careful must one be in adjusting the dosage. Intramuscular injection is the favorite method. A convenient rule is to begin with 0.01 gramme neosalvarsan for 1 kg. of the body weight, and to allow from eight to ten days to elapse between the first and second injections. Baginsky believes that there is no essential reason with children to prefer intravenous injection to the intramuscular method. He does not believe in combining salvarsan with mercury, but in selected cases would alternate them.

From this review of the literature and from personal observation it seems fair to conclude that, in the present stage of our knowledge, a positive diagnosis of syphilis as

affecting the parturient woman and her offspring, is best obtained by the recognition of the spirochetæ. The fact that this parasite is found in these cases in the walls of the umbilical vein and in the connective tissue of the umbilical cord, gives an opportunity for examination in every suspected case without exposing mother or child. The spirochetæ may be absent from the placenta, but, in the present state of our knowledge, they will be found in the larger percentage of cases in the location indicated. They are not present in the membranes in many instances; occasionally in the chorion; never in the amnion. When detected in the placenta they are found in the villi, and especially in the walls of these tissues. They are probably destroyed by the cells of the villi should the placental resistance be successful.

The diagnosis of syphilis may be made from the placenta when gummæ or placental abscess or marked overgrowth of the connective tissue of the placenta is present. The ratio existing between the weight of the placenta and that of the fetus must be kept in mind, for normally the placenta may be represented by one and the fetus by six, while in syphilis the placenta may be represented as one and the fetus as four, showing the marked increase in size in the syphilitic placenta. In cases where the mother is syphilitic, although the fetus may show no signs of syphilis, the spirochetæ are found in the cord in over 50 per cent., and where both parents are syphilitic the tissues of the placenta show evidence of syphilis in 70 per cent. The fact that when the characteristic germs are found in the placenta they are in the fetal portion, especially indicates that the transmission of syphilis is from fetus to mother through the leukocytes of the umbilical vein or through ruptured vessels of the villi. This renders the part played by paternal syphilis in the infection of the fetus much less important than was previously supposed.

Where the opportunity occurs to examine the organs of the fetus the spirochetæ are found abundantly. Bab found

them in all the organs of the syphilitic fetus, and especially in the connective tissues and in the walls of the bloodvessels. They were also present in ova and in spermatozoids. They were not detected in colostrum and but rarely in breast milk. Their presence in the body of the fetus would render a diagnosis of syphilis positive, although both parents might give a negative reaction to other tests. In three-fifths of macerated fetuses the spirochetæ proved the existence of syphilis.

The detection of the spirochetæ in the blood of either parent or in tissues removed from lesions, makes the diagnosis of syphilis positive in the individual. In making such examination one must remember that bichloride of mercury in 1 to 5000 solution causes the spirochetæ to disappear from the tissues, and hence care must be taken lest antiseptic precautions do not destroy the possibility of diagnosis.

The study of the spirochetæ has also given us information concerning those antigens which are formed as a protection against this germ. Thus it is found that the milk of the syphilitic mother contains bodies which protect against active infection. The mother then is especially well prepared to nurse her offspring, which may be, and probably is, syphilitic. If the child be syphilitic and the mother has no antigens then a syphilitic nurse is required; but if the mother be syphilitic and the child healthy the child should be artificially fed. In cases where there is no sign of syphilis about the infant but there is a possible suspicion that the disease may be latent the child should have a wet-nurse.

The discussion of the antigens of syphilis naturally brings up Colles's law, which was that the apparently healthy mother of a syphilitic child might nurse it with impunity, although such an infant would certainly infect another woman. Colles's law implied that some immunizing substance was transmitted from fetus to mother, thus protecting her against the child. The majority of writers at the present day are disposed to discard Colles's law and also Profeta's,

which is of much the same import. The explanation of the apparently healthy woman nursing safely the syphilitic child, lies in the latent syphilis of the mother and in the antigens which her breast milk contains, the modern doctrine being that it is the fetus which is the conveyer of syphilis and that no woman gives birth to a syphilitic child without herself acquiring the disease, although it may remain latent for an indefinite time.

Obviously, if the spirochetæ be the cause of syphilis then the destruction of this germ should cure the patient. Anti-syphilitic treatment is frequently successful so far as the mother is concerned, but the child dies. In these cases the toxins produced by the spirochetæ are the cause of fetal death. This fact renders the prognosis for the fetus of a syphilitic mother always exceedingly uncertain.

The study of the favorite habitat of the spirochetæ in the fetus shows that it is most numerous in the spleen or liver and in some portions of the placenta. Hence one may look to these organs for gross lesions indicating syphilis. It is interesting to observe that when the spirochetæ are retained in the maternal portion of the placenta, the Wassermann reaction becomes negative.

The technical difficulties of recognizing the spirochetæ and the necessity for some more simple diagnostic agent have caused great hopes to be based upon the Wassermann reaction. Experience shows that this is usually efficient, but there are sufficient exceptions to lead us to believe that the Wassermann reaction is rarely conclusive in pregnant or parturient women, and that it must be supplemented by the examination of the placenta, cord, and, if possible, the fetus for spirochetæ. The condition known as latent maternal syphilis, to which allusion has been made, where syphilitic spermatozoids are in the genital tract of the woman for some time, apparently creates an immunity against active infection, and also against the Wassermann test. These patients form antigens in the blood serum and also in the

breast milk. Such a woman may remain indefinitely in good health, but may convey latent syphilis to the fetus, through the ovum, decidua, or placenta.

In common with some other tests of similar nature, the Wassermann reaction is sometimes positive alike in the milk of syphilitic mothers and of those who are not syphilitic, although in the latter the reaction is not as pronounced as in the former; so pregnant women suffering from scarlatina may give a positive Wassermann reaction, and severe cases of eclampsia, where syphilis can be excluded, will give a positive Wassermann test. The macerated fetus frequently gives no reaction, although it may be syphilitic. The test fails in cancer of the uterus and in puerperal sepsis, in both of which it is positive, while in severe eclampsia it is especially well marked. Of cases of abortion about 15 per cent. give a positive Wassermann reaction. In the foundling asylum in Prague, Epstein tested all patients with the Wassermann test and found among mothers admitted to the institution that 10 per cent. gave a positive reaction, and of all the children 3.3 per cent. Obstetricians have frequently observed that a negative Wassermann reaction is no contra-indication to antisyphilitic treatment during pregnancy, if there is reason to suspect that the patient be syphilitic. In pregnant patients afflicted with diseases caused by protozoa, and those having tuberculosis, malignant growths, scarlatina, or pneumonia, the Wassermann reaction does not exclude paternal infection, which, although comparatively rare, must be admitted in some cases. Blood from the umbilical cord will frequently not give a positive Wassermann test, although specific disease be present, and hence this method is not reliable.

In its unreliability in pregnant patients the Wassermann test is analogous to the Abderhalden test for pregnancy. The latter gives a positive reaction in non-pregnant patients suffering from malignant disease, tuberculosis, suppurating lesions, and, in some cases, during the menstrual period.

The effort made by Noguchi to prepare from the spirochetæ a vaccine which might be used by hypodermic injection has proved most valuable in tertiary syphilis. This substance is called luetin, but has been less successful in pregnant patients than in others. We have as yet too little experience with parturient women in the use of this method to form a judgment.

The frequency of syphilis among parturient women is always a subject of interest. Fournier found that 20 per cent. of his female patients were married women, of whom 70 per cent. had syphilis before marriage and 30 per cent. afterward. In 76 per cent. of those syphilitic the signs of the disease appeared in the first six months after marriage. When the histories of the cases were analyzed it was found that in women who contracted syphilis after marriage, the husband had become infected less than three years before marriage. In such instances the first three years after marriage is the most dangerous period of the woman's married life. In order to marry safely, both syphilitic men and women should receive continuous and efficient treatment for at least six years before marriage.

The consequences of syphilis in parturient patients are frequently serious. The cervix is frequently the site of syphilitic lesions resulting in stenosis. In some cases edema of the cervix develops during labor followed by long delay and favoring infection with serious results. The earlier in pregnancy the infection occurs the more extensive are the placental lesions and premature separation of the syphilitic placenta is not uncommon. Where placental lesions are very slight the infection may have developed during the first stages of labor. It is estimated that the mortality of syphilitic and parturient women is 73 per cent., largely from mixed infection. This fact was impressed upon the mind of the writer by the case of a woman who, soon after giving birth to a child, developed symptoms of a violent septic infection. A skin lesion supervened which resembled

somewhat the appearances seen in cerebrospinal meningitis. The case was so rapid in its course and so extremely severe in its manifestations, and the cutaneous lesions were so atypical, that Kaposi was called in consultation, who made a diagnosis of acute syphilitic mixed infection. The course of the disease was as rapid as severe and autopsy proved the correctness of the diagnosis.

Puerperal morbidity is much increased by the presence of syphilis, and Hirsch calls attention to nephritis in the puerperal period as the result of this condition. Tertiary cases are not actively infective, but florid cases of syphilis during parturition and in the puerperal period are virulent. The milk of a parturient woman having florid syphilis has furnished material sufficient to inoculate guinea-pigs with syphilis.

It is commonly found that syphilis is a frequent cause of abortion, but this is denied by recent writers, and it is thought that fetal infection is most common during the last months of pregnancy.

Our modern knowledge of syphilis is especially interesting as regards the condition of latent syphilis in the pregnant woman, to which illusion has been made. This is held to be of ovogenous origin through the medium of the placenta. Apparently the infective germs may remain indefinitely confined to the embryo and its adnexa, and such a woman may give birth to several healthy children before the latent syphilis becomes active. A knowledge of this possibility may account for some alleged cures of syphilis and also for some cases in which the children are healthy and the mother also is thought to be sound.

Much interest will always obtain in the discussion of syphilis to the newborn child. Our modern knowledge indicates that syphilis is conveyed most frequently, first and directly through the ovum and, in the absence of a lesion of continuity in the mother's tissues, to the mother through the medium only of the ovum. Syphilis in the

newborn has long been recognized as a potent cause in the decrease and limiting of populations and those countries maintaining large standing armies naturally legislate and take action against syphilis, because of its destruction of infant life.

The diagnosis of syphilis in the living newborn may be made, as already stated, by examining the umbilical cord and detecting the spirochetæ in the walls of the umbilical vein and in the connective tissue surrounding the vessels at the umbilicus. In children apparently remaining healthy no spirochetæ are often found above the ring of tissue which surrounds the vessels at the umbilicus. Diagnosis of syphilis in the newborn may also be made by the *x*-ray, which shows the osteochondritis, which is a cardinal symptom of the condition. Examination of the blood in hereditary syphilis shows the hemoglobin reduced, the erythrocytes about 1,500,000, leukocytes about 20,000.

The course of syphilis in the newborn may be insidious and, without the detection of the spirochetæ, a positive diagnosis may be difficult. Sudden death in frail, ill-nourished infants is suspicious of syphilis. The nervous system is often involved from the start and syphilitic lesions are frequently present in the substance of the brain and in the pia mater. One must remember that syphilis in the newborn may be of varying duration. Thus some children acquire the infection during birth, while others are born with well-established and widely diffused lesions. Children born syphilitic may remain apparently healthy and quiescent as late as eight years, when they will develop diseases of the joints, the lymphatic glands, the bones, and the cornea. Both knees are often attacked, and the bilateral character of the disease differentiates it from tubercular disease of the knee-joint, which is unilateral. The blood serum in such a case and the synovial fluid from such a joint will give a positive Wassermann test. The cervical glands on both sides and both eyes may be affected. The ears commonly

escape. The characteristic lesions in the teeth and about the mouth develop.

If syphilitic children be followed during the first four years of life, it is found that 7 per cent. die before the end of the first year and that among such children tuberculosis develops in 12 per cent. As the child grows, the nervous system shows changes in 89 per cent. It must not be forgotten in dealing with the syphilitic newborn that such a child may infect its nurse.

To form some idea of the probable frequency of syphilis among the newborn in the poor of London on the East side, Fildes made the Wassermann test upon 1000 children at birth, then upon the mothers and children from two and a half to four months later. Blood from the cord was taken for the first test and later blood from the thumb or great toe of mother and child. Both Jews and Christians gave similar results. One infant in 1015 was found in this investigation to be syphilitic at birth; in all 5.9 per 1000, or 3.9 of mothers, gave a positive Wassermann reaction.

The clinical manifestation of congenital syphilis is frequently less severe than the acquired disease. In these cases the Wassermann reaction is usually reliable, the reaction to luetin useful in some but negative in others. The same is true of von Pirquet's test. In late syphilis, where the spinal fluid can be obtained for examination, the luetin test may prove useful. In children highly toxemic and syphilitic the Wassermann test may be negative. The mortality among the congenitally syphilitic is always high, but from 5 to 10 per cent. remaining alive after the first year. Modern investigators do not consider the pemphigus of the newborn as syphilitic. This is more often the result of a streptococcus infection. The characteristic lesions of congenital syphilis are found in the palms of the hands and soles of the feet; in the peculiar raw-ham color in the staining of the tissues about the anus and also about the mouth. The erythema seen about the genito-urinary organs is often

the result of the feces and urine retained in the diaper, and is not a mark of syphilis at all. So eczema seborrhoicum is not a sign of congenital syphilis. Raynaud's disease and basal meningitis may complicate the syphilitic condition. In these cases, lumbar puncture followed by examination of spinal fluid will give a positive diagnosis. The blood of the congenitally syphilitic child may be examined by the Wassermann test, and usually a positive reaction will be obtained.

THE MODERN TREATMENT OF SYPHILIS

The introduction of salvarsan has had the usual result following the employment of new remedies in raising unusual hopes and expectations of the cure of syphilis. The original salvarsan has been, to some extent, superseded by a later preparation called neosalvarsan. The present conditions obtaining in Europe have practically stopped the exportation of these products, and, as a result, American chemists have endeavored to manufacture them. In this they have been reasonably successful so far as clinical results indicate. Should international law ever become reëstablished, the original manufacturers might stop the domestic production in this country by invoking their patents.

The fact that salvarsan is essentially an arsenical preparation, and that parturient women bear arsenic well, and that children take it well, would indicate that the remedy might be useful in the treatment of syphilis in obstetric cases.

The necessity for vigorous prophylaxis to prevent the conveyance of syphilis is universally recognized. Pinard urges the utmost thoroughness in the examination of wet-nurses. Clinical observation shows that a woman may have become infected from a nursing infant and present no evident symptom of the condition. While nursing another child the specific infection may become evident, and the second child may receive infection. The same is true of infants with hereditary syphilis. Women should nurse

their children as a protection against syphilis, under proper precautions. In the interest of the child, antisyphilitic treatment during pregnancy and after labor should be thoroughly carried out with all hygienic precautions and the infant should be nursed by no one but the mother. It is a familiar fact that when the mother is treated early in pregnancy the results for the child as well as for the mother are much better than when treatment is first given in the later months. In both these cases the children may be born apparently healthy. Many obstetricians, for such treatment, prefer the use of mercury, usually in the bichloride. Thus Gaucher gives the mother pills containing 0.012 gramme of bichloride twice daily, or, by deep subcutaneous injection, 0.02 of a compound of mercury and benzoic acid in an alkaline solution. The pills and the injections may alternate, and should albuminuria develop the dose is reduced one-half. In the condition of latent syphilis, many obstetricians use iodide of potassium in doses as large as can be borne.

All observers unite in urging the importance of prophylaxis, and that all women qualifying as wet-nurses be examined most thoroughly. Nursing by the proper woman is a prophylactic measure as well for mother as child. In the interest of the child, where the mother shows the symptoms of active syphilis, Salge and others have had good results by injecting deeply into the muscles bichloride 0.02, sodium chloride 0.2, distilled water 10. Of this 0.10 c.c. are given at one injection. For the obstinate nasal condition, which accompanies it, adrenalin and silver nitrate locally are especially valuable. As has been stated, the mixed treatment—mercury in pill form, or iodide of potassium by mouth, alternating with bichloride by subcutaneous injection, or mercury inunction—is thought of decided value. In treating the father in suspected cases the mixed treatment is preferred.

Great interest naturally attaches to the use of salvarsan and its modifications in the treatment of syphilis in par-

turient women. In the newborn infant it seems best to administer by intravenous injection, the cubital vein being especially well adapted for this purpose, and the dose varying from 0.04 gm. to 0.1 gm. Baisch and others have found that it was not enough to give salvarsan to the nursing mother if the child shows manifestations of severe syphilis and the physician hopes to control them. In addition to the mother's treatment the infant should receive 0.15 to 0.3 gm. of salvarsan by intravenous injection. This treatment is especially successful where severe pemphigus is present. Some prefer to give the mother salvarsan while using mercurial inunctions for the child. In cases of active syphilis in pregnant patients, where skin lesions predominate, Bar had excellent results with the intravenous injection of salvarsan. The children, however, showed syphilitic lesions, although nursed by the mother. In his cases there was considerable mortality among the children and one death from pneumonia among the mothers.

One cannot be sure, in using salvarsan in a pregnant woman, that labor may not be brought on. Such cases are reported not only before term but at term, and where this happens the fetus is usually stillborn. We do not as yet know the cause for the fetal death. Probably the majority of obstetricians believe that the best results in treating syphilis in parturient women are obtained by using mercury and salvarsan. It seems to be the fact that salvarsan will destroy the spirochetæ, but that the fetus will perish before birth from toxemia, or, if it be born alive, from atrophy and malnutrition. It is well known that in some cases salvarsan produces abortion, its administration being followed by uterine contractions, bleeding and expulsion of the embryo.

The reaction of a given patient to salvarsan seems to depend considerably upon the length of time elapsing after the infection and the patient's general vigor. Thus in a healthy woman who became infected in the latter portion

of pregnancy from dishes used by a syphilitic person, the prompt use of salvarsan stopped the disease in the mother and the child was born healthy and survived in good condition.

After taking salvarsan it is not unusual for the temperature and pulse of the patient to rise considerably, and nausea, vomiting, and a chilly sensation to supervene. Red cells and hemoglobin are increased and arsenic can be detected in the excreta, in some cases about an hour after taking the remedy. The spirochetæ are destroyed with greater or less rapidity. The clinical test for the safety of salvarsan consists in the examination of the urine to detect the presence of arsenic and to observe whether or not nephritis is developing. It is a curious fact that in cases treated with salvarsan, syphilitic lesions of the nervous system frequently develop. Bar's experience has been considerable, especially with neosalvarsan, and he has seen active cases of syphilis greatly improved, among them an infant with hydrocephalus. He believes that a dose larger than 0.03 gm. should not be given. He has also observed a fatal case dying with symptoms of arsenical poisoning, which has caused him to consider the administration of salvarsan as a critical matter. His maximum dose is also that advised by Fabre and Berot. Yohulo reports in the *Gazette of Oriental Medicine* the case of a woman pregnant six and a half months, who received 0.49 gm. of salvarsan. This was followed by a chill and a temperature of 103.5° F. This subsided to return three days afterward, and the patient suffered with severe headache, became unconscious and partly paralyzed, and died. There was no albuminuria. The symptoms were those of cerebral apoplexy.

One of the largest series of cases reported is that of Sauvage, 130 pregnant women treated with salvarsan. Mild albuminuria, fever, vomiting, and moderately rapid pulse were frequently observed, but lasted but a short time. Arsenical poisoning and toxemia from the dead spirochetæ are the dangerous factors. The remedy should be limited

to cases which do not do well with mercurial treatment. Blood-pressure is raised, and some pregnant women, for this reason, cannot endure the treatment. In this series there were no interruptions to pregnancy and the initial lesions of syphilis promptly disappeared. The fetal heart seemed to beat more slowly and less strong, although 92 per cent. of the children were born living.

In a group of cases reported by Pinard and others, 217 pregnant women having syphilis were treated with mercury. In 61 cases the treatment failed to cause disappearance of the primary lesions. In 75 per cent. the child was born dead or dying. Where the infection had occurred sometime previously, mercurial treatment was inefficient, but, if the syphilitic infection occurred soon after conception and the patient promptly came under observation, a long mercurial treatment seemed efficient.

Salvarsan was most useful in cases of acute and rapidly developing syphilis. The percentage of living children, born after treatment by salvarsan in florid syphilis, was greater than in the patients treated by mercury. In some cases where the patient was not in good condition, small doses of Fowler's solution were given before the administration of salvarsan was undertaken.

Caution must be used in employing salvarsan in pregnant or syphilitic women who are profoundly anemic. Thus, Trelat lost such a patient who had received salvarsan, from apparent exhaustion in the first stages of labor. Salvarsan causes ulceration and necrosis in badly nourished patients, the granules of arsenic remaining in the tissues.

In the treatment of infants, Leonard, Findlay, and Robertson had a mortality in infants without salvarsan of 60 per cent. When neosalvarsan was used and mercury by inunction the children suffered a good deal of pain, and sloughing was sometimes seen. The combined treatment is best administered to the mother before the birth of the

child. The comparative value of antenatal and postnatal treatment for mother and child is seen in the high percentage of recoveries where salvarsan is used promptly. Sauvage reports 93 per cent. of recoveries in the mother; Boret and Fabre 100 per cent. Where salvarsan was used during prenancy, with the hope of producing an effect upon the child, it was found that the placenta contained arsenic derived from maternal blood. One can readily understand from this how the remedy reaches the fetus.

In selected cases, series have been found in which 97 per cent. of the children were born living, where the mother received the mixed treatment of salvarsan and mercury. If it is the one object of the obstetrician to secure a living child, salvarsan must be pushed, the smallest dose to be efficient being 1.5 gm. salvarsan and 0.5 gm. salicylate of mercury. Children should also receive treatment as soon as they are born. Bleymie had the interesting experience of giving 30 cg. to a case of puerperal sepsis, with recovery of the patient. The intravenous use of sodium iodide in Klemperer's experience (5 to 20 gm. 10 per cent. solution) increased the efficiency of salvarsan.

In the treatment of hereditary syphilis, Baginsky considers it necessary to use active measures. He relies upon inunction, and very rarely uses intravenous injections. He gives thirty baths, containing 0.5 to 0.10 gm. bichloride of mercury to 10 liters of water. He also uses by inunction 0.5 to 0.2 gm. in ointment. The usual period of treatment is from four to eight weeks. Where there are skin lesions he employs 0.5 per cent. sublimate alcohol or mercury in plasters. He also employs protiodide of mercury 0.002 to 0.006 gm. by injection. He frequently uses the iodides and sometimes mercurial inunctions. In using neosalvarsan his rule has been to give 0.01 gm. for each kilogram of body weight and to allow from eight to ten days to elapse between the injections. He has given salvarsan to infants by intramuscular injection and not by the intravenous method. He

has frequently found it of great advantage to alternate salvarsan and mercurial treatment.

Great anticipations were raised when the discovery of salvarsan promised to destroy syphilis. In common with many other experiences in medical progress, these expectations have not been fully realized. We have seen that in active syphilis of comparatively recent origin the drug, cautiously and promptly used, may destroy the spirochetæ, at the risk of acute toxemia for mother and child. Unless caution be exercised, arsenical poisoning may result. That important element in all diseased conditions, the resisting power of the patient, has peculiar force in the ability of certain cases to react well to treatment by salvarsan, and in the failure of others to profit by it. This is an element which cannot be accurately estimated. So far as pregnant patients are concerned, we believe that in the present stage of our knowledge the obstetrician will do best to limit his use of salvarsan to cases of active and recent syphilitic infection, and to use the remedy for a short time only and in moderate doses. Prolonged treatment by mercury and iodide of potassium is indicated. The danger of pregnant women infected by syphilis becoming anemic must always be kept in mind, and frequently iron, arsenic, and bitter tonics are required. The more thorough the treatment for the mother the better the chance for the child. With the latter, inunctions of mercury are especially valuable, and salvarsan may be reserved for cases where skin lesions are active and the infection seems especially virulent.

It may be well to heed a word of caution from a syphilographer of experience in Gottheil's summary (*Progressive Medicine*, September, 1915). He believes it is an acknowledged fact that tabes and paresis directly result from syphilis. Many cardiac and vascular diseases formerly attributed to alcohol and other intoxicants are directly the result of syphilis. Much chronic disease of the viscera

is undoubtedly syphilitic, and syphilis vies with tuberculosis as a cause of general morbidity.

In early syphilis the recognition of the living spirochetæ is especially valuable in diagnosis. Treatment should not begin until the diagnosis can be established, but no time should be lost in making a diagnosis and then in promptly beginning treatment. Where the chancre is present the spirochetæ are readily found in scrapings from its surface, while the blood test is always available. In local treatment, cleanliness and mild bichloride solution or mercurial ointment or powder are all that are required. In the constitutional treatment, salvarsan is useful in the early stages, but mercury remains our great reliance, to be given in all stages, but most vigorously in the early ones; iodine for late syphilis, not excluding the other two drugs.

These general recommendations may be carried out by from four to eight intravenous injections of neosalvarsan, as soon as the diagnosis is made, at intervals of five to eight days. Between these injections, from 12 to 20 intramuscular injections of an insoluble mercurial given at intervals of about a week; then a rest of several months and a blood examination; then a similar course of treatment, varying the dose and extent in proportion to the patient's reaction. This would carry the pregnant patient through her pregnancy and labor, and Gottheil's rule for the treatment of late syphilis would come into play after the puerperal period. For the later stages he urges a thorough use of iodine as much more efficient than salvarsan.

If a man had been under thorough and prolonged treatment for several years, and then for one year without treatment, and had shown no syphilis, he was formally considered in a condition where marriage might be permitted. Many of these patients, however, never give a permanently negative Wassermann reaction. Such must, in the present stage of our knowledge, be considered as not contagious and allowed to marry, although they cannot be said to be completely cured.

SYPHILIS IN RELATION TO SOME SOCIAL PROBLEMS[1]

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I. HEREDITARY SYPHILIS IN THE LIGHT OF TODAY

Within a couple of generations of the appearance of the great epidemic of syphilis that swept over Europe at the end of the fifteenth century, physicians began to notice that infants born of infected women often came into the world suffering from the sins of their parents (Paracelsus, 1529).

Until a recent period, the way in which syphilis was transmitted to the offspring was thought to be clear. Women with active syphilis gave birth to dead children showing evidence of the disease, or to children which soon after birth showed such evidence, or a dead fetus was expelled prematurely. The circumstance that such incidents occurred in the case of women who had acquired the disease after conception by a healthy father was proof that the infection of the fetus took place by way of the blood current, the infectious elements passing through the placenta from the mother to the embryo. In the case of women who were syphilitic before conception, an infection of the ovum through the

[1] Presented by invitation of the Council to the American Gynecological Society at the forty-first annual meeting at Washington, May 9 to 11, 1916.

mother's syphilis was regarded as a satisfactory explanation of the disease in the infant. There could be, of course, no proof whatever of the occurrence of this mode of infection. The finding of spirochetæ in the unimpregnated ovum of a syphilitic woman might lend some weight to the hypothesis. but even that would not be proof. The probabilities, indeed, are that an ovum harboring spirochetæ would not be capable of developing into a fetus.

Transmission of the disease from a syphilitic father to the fetus was regarded as the most frequent event in hereditary syphilis. It was a common observation that healthy women showing no signs of syphilis gave birth to syphilitic children by syphilitic fathers. Assuming that the mother was free from the disease, transmission by way of the semen to the ovum was a necessary corollary. Proof of this mode of infection was found in the fact that treatment of the father alone often resulted in the later production of syphilis-free children, and the strongest proof of paternal conceptional syphilis was derived from the so-called exceptions to Colles's law.

Colles, in 1837, called attention to the fact that the healthy mothers of syphilitic infants might nurse their babies with impunity, while a healthy wet-nurse suckling the child would almost inevitably acquire syphilis. This observation was elaborated by Baumé, and is known on the Continent as the Colles-Baumé law. Further observations showed that there were occasional exceptions to this rule. It happened sometimes that the healthy mother nursing her syphilitic infant acquired syphilis, the primary lesion appearing generally on the breast of the mother. These cases of exceptions to Colles's law were regarded as clinching the evidence in favor of paternal syphilis, for if the mother could acquire syphilis after the birth of the child, it followed, of course, that she was not syphilitic before and that the infant's syphilis must have been acquired from the father;

that is, that the syphilitic semen of the father conveyed the syphilis to the ovum at the moment of conception.

The theory of the paternal transmission of syphilis prevailed until almost the present day, though there was no lack of opposition to it on various grounds. It was pointed out, in the first place, that this kind of hereditary transmission of a disease was unique—was unknown in the entire range of pathology. In the second place, the apparently cogent fact that treatment of the father alone sometimes resulted in the birth of healthy children, lost its importance when it was shown that healthy children sometimes alternated with syphilitic children even when no treatment had been administered, and that women known to be syphilitic often gave birth to healthy children in their later pregnancies, even though no treatment had been administered to either parent. Furthermore, the argument derived from the "exceptions to Colles's law" lost its weight when a closer inquiry was made into the supposed infections of the mother through her nursing infant. These rare cases date from the period of forty or fifty years ago, when our clinical knowledge of syphilis was somewhat inexact. We know now that isolated lesions may occur in the secondary period of syphilis that bear a strong resemblance to the primary lesion of the disease, and that such lesions are apt to occur at the site of irritation of the skin—so, for instance, in the nursing mother, at or near the nipple. Since the salvarsan period, among the hundreds of cases of reinfection after salvarsan—cases that were presumed to prove that a single injection of salvarsan had cured the patient—a great many are undoubtedly cases of solitary papules of the secondary period. The old cases of supposed infection of the mother by her syphilitic infant, so far as we have careful records of them, cannot withstand the more critical examination of recent times. Finally, the circumstance that the mothers of syphilitic infants so frequently presented neither signs

of the disease nor history of infection lost its value in the light of knowledge based on accumulated statistics covering an enormous number of cases. In less than half of the cases of syphilis in women, in fact in little more than one-third of them, presenting definite tertiary lesions, there is no history of infection nor of any lesions of the earlier period of the disease.

These considerations sufficed to render the theory of paternal syphilis extremely doubtful even ten years ago. The achievements of the recent period, the period of the spirochete and the Wassermann reaction, have served to relegate it to the limbo of things medical that have only an historical interest. I have never seen an infant with active syphilis whose mother's serum did not give a positive Wassermann reaction. This experience, based now on thousands of cases by many observers all over the world, is virtually without exception. If we regard a positive Wassermann reaction as proof of syphilis—and syphilidographers are unanimous on that question—then there is no need to introduce the phenomenal element of paternal syphilis to account for the syphilitic infant. The child is syphilitic because its mother is syphilitic. A syphilitic child cannot infect its mother, because its mother is already infected, and Colles's law merely expresses a truism.

Similarly, Profeta's law, that the "healthy" infant cannot acquire syphilis from its actively diseased mother, is explained through the Wassermann reaction in the same way; the child is already syphilitic without at the time showing any evidence of the disease other than a positive Wassermann reaction. Indeed, it required only more careful observation extending over a long period to show that both Colles's and Profeta's law were not well founded. The mothers of syphilitic children and the children of syphilitic mothers very often present clinical evidence of their disease if we follow them long enough.

To illustrate with a few cases: Both parents of a syphilitic infant deny infection and present no signs of the disease. A dead fetus a year ago. Both give a strongly positive Wassermann reaction but refuse treatment. A year later the mother applies for treatment for a scaling serpiginous syphilide on the thigh. This woman nursed her child without harm to herself, "proof" of the correctness of Colles's law. She had presented no clinical evidence of syphilis until two years of the dead, presumably, syphilitic fetus, and might have passed as an example of a healthy woman giving birth to a paternally infected child.

The mother of three healthy children applies for treatment for a superficial gummous ulceration of the forearm which had persisted for four years. Never ill before. Married ten years. No miscarriages. Wassermann reaction strongly positive. The father admits infection three years before marriage, for which he had received the current inadequate treatment with pills, was pronounced cured and permitted to marry. No trouble since. Wassermann reaction 4+. Examination of the three children, eight, seven, and four years of age, respectively, discloses no symptoms of the disease, but the two older children have a 4+ Wassermann reaction; the youngest is negative. Had this woman been known to be syphilitic, the fact that she nursed her children without infecting them would have been regarded ten years ago as proof of the correctness of Profeta's law. The oldest of these children, now eleven and a half years of age, is still Wassermann-positive and asymptomatic; the second child developed interstitial keratitis at the age of ten; the youngest is still negative and is probably not syphilitic. So far as her history shows the first sign of syphilis in the mother appeared as a late lesion six years after marriage.

A lad of six years received a blow on the shin. The resulting swelling did not subside, and after four weeks he

applied to a surgical clinic, where a fluctuating tumor over the bone was incised. The wound not healing, a blood test was made, and a 4+ Wassermann reaction being found, the case was referred to me. Osteoperiostitis gummosa of the tibia. The boy was the third of six healthy children out of seven pregnancies, the fourth pregnancy having resulted in a miscarriage. This history indicated the probability of an acquired syphilis, an infection of the child in infancy, but this surmise was found to be erroneous on further examination. The mother and every one of the remaining five children gave a strongly positive Wassermann reaction, without history or other symptoms, while the father presented signs of a beginning paresis.

Since the discovery of the spirochete, additional evidence of the maternal source of infantile syphilis has been adduced by careful studies of the placenta in syphilitic infants. The gross and microscopic changes of the syphilitic placenta have long been known, but it is only recently that spirochetæ have been shown to be present in the diffuse and wedge-shaped indurations of the syphilitic placenta, and present moreover on the maternal aspect of that organ as well as on the fetal side. Such a location necessarily implies an infection of the mother.

In view of the evidence of maternal syphilis in the case of syphilitic infants derived from spirochetal findings in the placenta, a constantly positive Wassermann reaction, and the frequent development of subsequent syphilitic lesions in these women, together with the prevailing absence of any history of syphilis in women with late lesions of the disease—in view of these facts it seems idle to discuss the question of the possibility of paternal syphilis through spirochete-containing spermatozoa. A spirochete is about three times as long as the diameter of a spermatozoön head, and we can hardly imagine a spermatozoön so freighted finding its way to an ovum and performing there its physio-

logical function. Nor is it likely that spirochetæ lying free in the semen reach and penetrate the ovum simultaneously with the spermatozoa. All that we know from experiments on invertebrates and lower vertebrates tends to prove that the slightest disturbance of a single blastomere in an egg results in a failure in development. It is true that, though no one has ever seen a spirochete in the spermatic fluid, in an extended series of experimental inoculations with the semen of syphilitics a few have been successful. It is possible that these occult seminal spirochetæ may explain one way in which the woman is infected, but that they may infect an ovum which nevertheless goes on to the development of a fetus seems quite out of the question. The idea which I strongly advocated on clinical grounds, five years ago, that there is some form of resting or resistant stage in the life-cycle of the spirochete, possibly a granular form of the organism, seems to me to possess a high degree of probability, and, if it be true, the absence of visible forms of spirochetæ in semen, which nevertheless is infectious, is explained. Such hypothetical granules might, of course, be carried by a spermatozoön, but for reasons already mentioned it seems unlikely that this kind of infection of an ovum can occur and the ovum undergo the changes incident to impregnation. Such spirochetal "Dauer-forme" may serve, however, to bring about an intra-uterine infection which, like a subcutaneous infection, may run an aberrant course and show little or nothing of the clinical symptoms of the secondary stage.

It seems equally futile to discuss the possibility of explaining the mother's positive Wassermann reaction as due to the absorption of Wassermann bodies from the (paternally) infected fetus. The possibility of such an absorption must, of course, be admitted theoretically if we admit the possibility of paternal syphilis, but no proof can be adduced. On the other hand, if the Wassermann bodies in the mother's

blood were due to absorption from the syphilitic fetus, the expulsion of the fetus in which the Wassermann bodies are produced would soon be followed by the disappearance of the mother's positive Wassermann reaction. This we know is not the case; the positive Wassermann reaction in the mothers of syphilitic babies persists until they are freed from their syphilis. Just so, conversely, the healthy child of a syphilitic mother escaping infection may show a positive Wassermann reaction at birth, the Wassermann bodies of the mother's blood serving to give the Wassermann reaction in the child's blood; but if the child is not syphilitic, its Wassermann reaction soon becomes negative.

The product of conception in the syphilitic woman may be a syphilitic fetus prematurely expelled, or the child may be actively syphilitic at birth, or it may present signs of active syphilis soon after birth, or it may show no signs of the disease except a positive Wassermann reaction until several years after birth. In a succession of pregnancies Kassowitz's rule—decreasing grades of infection—applies in the majority of cases. But sometimes a syphilitic woman may bear healthy and diseased children alternately, or without any apparent rule, and it has been observed that one of a pair of twins may be diseased, the other healthy. Finally, we have the cases of *syphilis hereditaria tarda* in which no evidence of the disease appears until quite late in the life of the child, or even as late as the twenty-fifth or the thirtieth year.

The causes of these apparently mysterious variations are quite clear, it seems to me, if only we bear in mind the nature of the syphilitic infection and the physiology of pregnancy. In a recent case of syphilis the mother's blood is flooded with spirochetæ. These do not pass into the fetus until the placental circulation is established; hence, infection of the fetus with abortion before the third month does not occur. If the mother has an acute spirochetal septicemia

at the time that direct connection between her circulation and that of the fetus is established, infection of the fetus is inevitable, the fetus is killed in the course of a few weeks, and soon expelled; hence, miscarriage of a dead fetus after the fourth month. (Miscarriage between the fourth and the seventh month, the fetus being born alive, is rarely, if ever, due to syphilis.) If the infection of the woman takes place after conception the effect on the fetus will depend on the period of the woman's infection. Infection in the early months of pregnancy will probably have the same result as infection shortly before conception. The mother will be actively spirochetemic at a time when the fetus offers little resistance to the infection through the placenta and is killed by it. But if infection of the mother takes place later in the pregnancy, about the fifth or the sixth month, the child may be born alive with the signs of an active syphilis. If infection of the mother occurs in the eighth or ninth month the child has a fair chance to be born healthy, escaping infection entirely, because it takes several weeks after infection for the mother's blood to be so charged with spirochetæ as to make infection of the fetus inevitable; and, furthermore, the spirochetæ must encounter some additional delay in the passage through the placenta.

The syphilitic woman who has passed through the early period of her disease, say, after the second year of her infection, harbors spirochetæ, but they are located in the tissues, and only occasionally find their way in small numbers into the blood. In the later stages of syphilis it is a comparatively rare event to find spirochetæ in the blood, and attempts at inoculation with the blood at this period are successful in only a small proportion of cases. This fact explains the erratic course, the haphazard occurrence of syphilis in the children of late syphilitic women. It is a matter of chance whether or not a few of the spirochetæ occasionally present in the mother's blood at this time happen to reach the

placenta. Sometimes they do, and then the child is syphilitic; sometimes they do not, and then the child is healthy. But if a few spirochetæ make the passage of the placenta and enter the fetal circulation, does the fetus undergo the same series of events that occur after infection in acquired syphilis? By no means, and for the obvious reason that the child's blood is the mother's blood, and the mother's blood at this stage of her disease contains substances, the product of the interaction of her tissues and the spirochetæ, that confer on her tissues that modified immunity which we find in the late stage of syphilis. This is, of course, not true immunity, but during this stage the tissues are resistant to a fresh infection from without, and a few spirochetæ that make their way from syphilitic foci into the blood of their host do not proliferate to any extent, do not reproduce the conditions that prevailed on their first eruption into circulation two or three months after the original infection. The term anergy has been employed to designate this modified form of immunity.

The spirochetæ in the mother's blood in the later stages of her syphilis, penetrating by change to the fetus, find there the same anergic condition that prevails in the mother, and the organism can produce only those lesions that they might have produced in the mother; that is, the lesions of late syphilis. *The fetus is anergic before it becomes spirochetal.* A spirochetal focus thus deposited in the tissues of the fetus will serve to keep the child's blood Wassermann-positive, but it may remain in a state of quiescence in the child, just as it may in any late syphilitic, for an indefinite period, and only after many years occasion the late lesions of "hereditary" syphilis when some special stimulus provokes it to activity. To assume that the victim of a lesion of *syphilis hereditaria tarda* must have passed the early manifestations of syphilis and to speculate on the possibility of these manifestations having occurred *in utero*, or of having

been of so mild a degree as to have escaped observation in infancy, is as unnecessary as it is unscientific.

In a considerable percentage of cases of habitual abortion in the early months, in which a dead and macerated fetus is born, no evidence of syphilis is found in the fetus. I do not know of any recent investigations on this class of cases from the syphilidological point of view; but the old idea that syphilis of the father may cause a deterioration of his semen analogous to that produced by alcohol or lead poisoning, which renders the ovum fertilized by it incapable of development into a normal fetus, need not be entirely rejected. Specific treatment of the father, if he presents evidences of syphilis and the mother none, may result in the production of a healthy child. I must repeat, however, that there is at present no scientific proof of this view; it rests merely on general considerations.

The obvious practical conclusions to be drawn from the facts of "hereditary" syphilis, in the light of modern pathology, is that the Wassermann test should be employed in every case of abortion or miscarriage; that syphilis should not be regarded as the last explanation to be applied in a given case while all sorts of fancied causes—adhesions, displacements, etc.—are regarded as satisfactory; but that syphilis should be thought of first. In view of the readiness and the certainty with which a suspicion of syphilis may be confirmed or rejected a Wassermann test should be as much a part of the gynecologist's armamentarium as the test for albumin. It is not my function to discuss the Wassermann reaction itself, suffice it to say that for the syphilidologist a positive Wassermann reaction, excluding only some rare and readily recognized conditions, is a positive and infallible proof of syphilis. There is only one warning I should wish to express in the light of an experience of many thousand Wassermann tests made for me on cases personally observed. The test is not an automatic process; it is made

by a human being in a laboratory, and, like any other human process, it is subject to a factor of error. Mistakes are sometimes made. It is my rule, if the Wassermann reaction does not harmonize with my clinical expectation, to have the test repeated. As to the interpretation to be placed on a doubtful one or a weakly positive reaction, much will depend on the particular antigen employed; but a weak or doubtful reaction in the class of cases that concerns the gynecologist or obstetrician has in general a considerable significance. At any rate the test should be repeated after the lapse of a few weeks, and it may sometimes be well to administer a provocative injection of salvarsan which will have the effect of increasing the intensity of the reaction if syphilis be present. The importance of definitely establishing a diagnosis, the importance to the individual, the family, and the community, and incidentally to the reputation of the physician, justifies, nay, demands, this harmless procedure. Furthermore, in every case of syphilis in a wife or mother the husband and all the children should be examined; and in the case of syphilis in the child, both parents and the other children should be examined. In this way only will it be possible to forestall, through knowledge and adequate treatment, the frightful possibilities of a neglected syphilis.

II. WHEN MAY THE SYPHILITIC MARRY?

The recent progress in our knowledge of syphilis has greatly changed our views both as to the gravity of the syphilitic infection and the criteria of cure. On the other hand, the new remedies have greatly improved the prognosis of syphilis and increased the prospect of a successful therapy.

Although the first glimmerings of visceral syphilis were recognized nearly seventy years ago, it is only within the past decade that we have come to a realization of the enor-

mous and far-reaching damage that may result from the spirochetal invasion, and only three years since Noguchi's discovery of spirochetæ in the brain of paretics swept away the dust of a fifty-year-old controversy and gave the palm to those clear-sighted clinicians who for half a century had contended for the view that paresis and tabes were syphilitic diseases.

In addition to the risk of developing one of these grave and hopeless diseases of the central nervous system, the greatest danger to the syphilitic lies in the prospect of early death or prolonged invalidism from injury to the blood-vessels resulting in cerebral hemorrhage or aortic disease. When we realize the fact that from 2 to 5 per cent. of the cases of syphilis develop tabes or paresis and that in not less than 80 per cent. of a series of nearly 500 autopsies on syphilitics, recently summarized from the records of the Leipzig General Hospital, more or less grave disease of the aorta, ranging from a mild mesaortitis to an aneurysm, was disclosed; when we remember that in a fair proportion of cases the wives and children of syphilitics become infected; and when we add to these alarming statistics the fact that every one of these cases might have undergone the current treatment considered adequate ten years ago, been pronounced cured and permitted to marry; when we realize these facts, it is evident that the criteria of cure up to ten years ago were wofully inadequate and often resulted in the most frightful misfortunes for the victim of the disease and for the family.

The question of the medical sanction to the marriage of the syphilitic has long occupied the attention of the syphilidographers. The principles laid down by Fournier forty years ago had generally been adopted, with but little modification. The syphilitic might marry if he had received three years of treatment with mercury and iodides, beginning soon after his infection, and if then, during another year or preferably

two years without treatment, he remained free from any signs of syphilis.

That in a considerable proportion of cases, that fulfilled these requirements and married, infection of the wife and children occurred, or the patient later was overwhelmed by one of the terrible accidents of the tertiary period, is proof of the inadequacy of the criteria of cure at that time. There were, unfortunately, no means of determining when the last trace of the specific virus had left the system; no gong was sounded when the patient was cured. We did the best we could. Often enough, indeed, we found it a struggle to induce the patient to submit to the minimum of treatment considered adequate and to postpone his marriage until the minimum lapse of time regarded by the consensus of the best medical opinions as necessary. The millions of happy marriages undertaken in accordance with the rule empirically adopted, marriages in which healthy children were produced and the patient lived out his normal span of life without ever again being reminded of his early disease attest the wisdom of the rule. But, on the other hand, the thousands of cases in which a marriage undertaken after compliance with the demands of the syphilidologist resulted in infection of the wife, in the production of miscarriages or syphilitic infants, or in children apparently well that later became blind or deaf, or were overtaken with any one of the lesions of hereditary syphilis; or who themselves in later years developed tabes or disease of the heart or aorta, or died too young from cerebral hemorrhage: all these occasional events in the life of the syphilitic pronounced cured and permitted to marry showed that the rule was by no means infallible, and that the marriage of the man once syphilitic was at best a matter attended with considerable risk. We had, however, no choice in the matter. To carry out our reasoning to its logical conclusion, there remained no course but to forbid forever the marriage of the victim

of a syphilitic infection. Such a conclusion would have worked such manifest injury to so many people that the alternative of permitting the patients to assume what seemed after all a relatively small risk was justified.

It must be borne in mind that the great majority of syphilitics recover entirely from their disease after good treatment with mercury alone, and sometimes it must be admitted with very little treatment. In 1892 I saw a young man with a chancre, adenopathies, and a beginning roseola. He was a travelling salesman and only occasionally consulted me during the succeeding two years. His medication was, I thought, absurdly inadequate; several courses of pills of tannate of mercury. In 1894 he came to me with a breaking-down gumma of one testicle, which responded promptly to injections of salicylate of mercury and was absorbed without ulceration. He disappeared from treatment after four injections, and six months later informed me by letter that he had recently married. In due time he become the father of two apparently healthy children, his wife enjoys good health and has never had a miscarriage, and two years ago, when I had an opportunity to make a Wassermann test upon him, I found his serum normal. Instances like this, which every syphilidographer can duplicate in his practice, teach us that syphilis is not inevitably the frightful monster it sometimes shows itself to be. It is not, however, on cases of such exceptionally favorable character that we base our rules of treatment nor our prognosis in regard to marriage. Nevertheless, such cases serve to emphasize the injustice that would be done by a rule forbidding the marriage of syphilitics who have received good treatment and have gone without symptoms for a considerable period.

Happily, the last dozen years that have given us the cause of syphilis and a new specific remedy for it have produced also a criterion of cure that has taken a heavy load of responsibility from our shoulders.

A positive Wassermann reaction, except in certain rare and readily differentiable conditions, is a positive indication of an existing syphilis. The converse, that a negative Wassermann reaction is an infallible sign of the absence of syphilis is, of course, not true. The reaction in a syphilitic may be negative in consequence of alcohol or possibly some other substances temporarily present in the blood; it may be negative in consequence of recent though insufficient treatment; it is always negative in the first two or three weeks after infection; it is commonly negative in malignant syphilis; it is often negative (in the blood) in treated cases of tabes and paresis, while still positive in the cerebrospinal fluid. These questions of the interpretation of the Wassermann reaction are the subject of another paper in this symposium and need not be further discussed here. Suffice it to say that a negative Wassermann reaction alone is not a sufficient criterion of cure, though a positive reaction is a practically certain proof of non-cure.

Basing our conclusion on the established practice of the clinical masters who formulated the rule for guidance in the case of syphilitics who are candidates for marriage, and bringing it to accord with the recent teachings, I should say that the marriage of the syphilitic might receive medical sanction if the patient had undergone treatment for a period which could not be arbitrarily fixed, had remained free from symptoms—including a positive Wassermann reaction as a symptom—for at least one year and preferably two years after cessation of treatment, had at the expiration of this period reacted negatively to a provocative injection of salvarsan, and finally had shown no signs of abnormality in the chemical or cellular constituents of the cerebrospinal fluid. Such a case might, in the light of our present knowledge, be regarded as cured.

It will be observed that no definite period of treatment is specified. The treatment should be carried out system-

atically until the patient's Wassermann reaction becomes negative, and for a sufficient time after that to secure in the judgment of the physician a permanently negative reaction. This period may be a couple of months or it may extend over several years. In the case of the patient who is seen within a few days after the appearance of the initial lesion, before the Wassermann reaction has yet become positive, the diagnosis of syphilis being based on the appearance of the chancre and on the presence of spirochetæ, a single energetic course of salvarsan and mercury, five intravenous injections of salvarsan at short intervals and eight intramuscular injections of one of the insoluble salts of mercury, one each week, will, with almost mathematical certainty, cure the patient. Furthermore, whenever the location of the lesion makes it possible the chancre should be excised. Every case in my experience treated in this way during the past five years has remained free from symptoms, Wassermann-negative, and negative after a provocative salvarsan injection, and negative in the cerebrospinal fluid. These cases are certainly cured and their marriage may be permitted. I am personally of the opinion that in these early cases treatment with mercury is not necessary; I throw it in as a sop to prejudice. In two of my cases I relied on salvarsan alone and with entirely satisfactory results. I do not doubt that these cases are cured immediately after the conclusion of the course of treatment—the numerous authentic cases of syphilitic reinfection after a single energetic course of salvarsan would seem to establish that fact—but I should deem it foolhardy in a matter fraught with such grave possibilities not to insist on the lapse of a period of a year or two of observation and test before sanctioning marriage.

In the case of patients who come for treatment after a wide dissemination of spirochetæ has taken place, patients with a positive Wassermann reaction and an eruption of the

secondary period, the results of a single course of treatment are often not less striking than those we observe in the cases treated abortively in the early primary stage. But not always. In general, I should say that the prospects of a successful *therapia magna sterilisans* diminish with the length of the elapsed time after infection, and the treatment begun in the secondary stage should be carried on for a period of not less than a year, treatment with salvarsan and mercury by the interrupted method, and thereafter for another year the Wassermann reaction should be carefully watched. In the late secondary stage, and in the tertiary stage, the treatment should extend over a sufficient period to render the Wassermann reaction negative, and should then be continued, with negative Wassermann reactions, for another year. The Wassermann reaction may become negative after the first course of treatment in these cases; the treatment, however, should be continued for another year. Or the Wassermann reaction may not become negative until after several courses of treatment; or, again, in some cases, the Wassermann reaction cannot be made permanently negative at all. It is evident, therefore, that the attempt to fix upon an arbitrary period of time for the duration of treatment, such as two years or three years, is vain and unscientific. The consent to marriage should await the establishment of a permanently negative Wassermann reaction, as tested by repeated examination of the serum after the cessation of treatment, and finally by a provocative salvarsan injection.

With regard to those resistant cases that, despite energetic treatment, constantly remain Wassermann-positive, or after a brief period of negative reaction relapse into a positive without showing any other symptom of syphilis, what should be our attitude toward them on the question of marriage? By the old standards before the Wassermann period no physician would have raised any objection to their

marriage. In a certain proportion of the resistant-Wassermann cases an examination of the cerebrospinal fluid will disclose evidences of syphilitic involvement of the central nervous system. Such patients are, *ipso facto*, excluded from marriage. While, of course, the chance of their being sources of infection to their connubial partners is small, there is, nevertheless, the possibility of such an accident; but aside from this risk the victim of an incipient tabes or paresis has no right to marry, and our consent as medical advisers must be withheld. But in a certain proportion of these resistant Wassermann cases the central nervous system is found unaffected. The syphilitic focus lies possibly in one of the abdominal viscera, or, more probably, in view of the statistics of aortic diseases in syphilis, in or around the walls of the bloodvessels, without at the time giving any clinical evidence of focal disease. What should be our attitude toward the marital ambitions of these cases, old syphilitics who are free from symptoms of their disease, whose cerebrospinal fluid is normal, and who are persistently Wassermann-positive?

The question resolves itself into two phases: Confident as we are that a persistent positive Wassermann reaction means a persistent syphilis, we may consider (1) the risk to the patient of the future development of a serious syphilitic lesion in some important or vital organ, heart, aorta, or central nervous system; and (2) the risk of infection to the wife and children. The first part of this question concerns us as medical men, because we know as medical men the risk the patient runs; but it is on broader sociological and humanitarian grounds that we must oppose the marriage of one whose early death or prolonged invalidism may deprive the family of its bread-winner, or may render him a burden to the family and possibly to the community. The man who faces such a prospect has no right, on purely economic grounds, to marry. He would be called a bad

risk by a life insurance company, and no company would issue an ordinary policy of insurance to such a man. He would probably be advised to continue treatment and apply again when his Wassermann reaction becomes negative. The candidate rejected for life insurance, whether it be on account of Bright's disease or of syphilis, should not be accepted as a candidate for marriage; certainly not without making a full statement of his condition to his prospective partner or her family, and if syphilis is confessed the probabilities are that the conscientious medical adviser will not be called upon to exercise any unpleasant authority to prevent the marriage.

The second phase of the question, What is the risk of infection to the wife from the Wassermann-positive husband, cannot be answered mathematically. That the syphilitic who presents no objective signs of his disease may still be a source of danger to his wife, is obvious from the histories of the thousands of unfortunate marriages contracted by syphilitics who had complied with the Fournier requirements but nevertheless infected their wives. In these cases it seems reasonable to suppose that the Wassermann reaction had remained positive. Recent experimental work on the persistence of the spirochetæ in the blood in latent, *i. e.*, symptom-free cases of syphilis with a positive Wassermann reaction has demonstrated the infectiousness of the blood in a small proportion. Successful inoculations have been made with the blood of latent syphilitics, five or six years after their infection; and the numerous cases of marital infection by latent syphilitics, infection proven by the occurrence of symptoms in the wife or the birth of syphilitic children, find a scientific explanation in these demonstrations. By what means the spirochetæ make their way from the blood of their host to that of the recipient of the infection, we do not know; but the cases of successful inoculations with the semen of syphilitics afford a possible clue.

In brief, the Fournier rule failed in a certain proportion of cases, infection took place notwithstanding the apparent cure of the patient; in a certain proportion of treated cases the Wassermann reaction remains positive in the absence of somatic symptoms; in a certain proportion of these latent Wassermann-positive cases the infectiousness of the blood has been proven. It seems a reasonable assumption that those old cases that infected their wives were Wassermann-positive, just as today the asymptomatic fathers of syphilitic children and husbands of chaste syphilitic women are still found to be Wassermann-positive. The woman, therefore, who marries a Wassermann-positive asymptomatic syphilitic distinctly runs a risk of infection by her husband, and however small that risk may be it is our duty as medical men to interpose our veto.

I am aware that in taking this stand I am not in agreement with some of my colleagues whose position in regard to this question remains unchanged from the time of Fournier. I should be willing to stand alone in my opinion! Those who regard the old requirements as sufficient to warrant marriage ignore the teachings of the last ten years, or they fail to follow these teachings to their logical conclusion. They say, with a shrug of the shoulder, "the risk of disaster to the uncured syphilitic and his family after five years is not very great; let him take a chance; life is at best a hazardous business."

To my mind this attitude, in the light of our present knowledge, is indefensible. Is it not a fact that the blood of the Wassermann-positive syphilitic at any period of the disease may contain spirochetæ? Is it not a fact that the semen of syphilitics who have no symptom but a positive Wassermann reaction may be infectious? And, above all, is it not a fact that thousands of marriages contracted by asymptomatic syphilitics in the later stages of their disease have resulted in infection of the wife and children? What matters it that tens of thousands of such marriages have

not been followed by disastrous results? The question that we as medical men have to answer is, Can we assure the Wassermann-positive asymptomatic syphilitic that he may marry with as little risk to his wife as if he had never been syphilitic? The answer to this question must be an emphatic no! I know that the *argumentum ad hominem* is not always justifiable, but sometimes it clarifies a situation to bring a question down from the abstract to the concrete and personal, and I should like to ask you, and you, and you, my dear doctor, whether you would be willing to permit the marriage of *your* daughter to a latent Wassermann-positive syphilitic. You need not reply; I know your answer.

One consideration remains to be added: we are physicians, not judges; we may not be warranted in attempting to control the lives of two individuals and their right to happiness in marriage. The late-syphilitic generally does not infect his wife. If the woman chooses to run the risk of infection, a risk which we admit is not very great, it is her affair; but we should never grant our consent to the marriage of the uncured syphilitic unless the prospective wife has been fully informed of the chance she is taking for herself and her prospective children. Unfortunately we cannot tell her in mathematical terms how great or how small this risk is, whether it is one in twenty or one in a hundred. In practice, however, the stand I advocate would generally result in an interview with the father of the intended bride, and he in his ignorance and perplexity would surely turn to us with the question, "Well, Doctor, what would you advise?" It behooves us therefore to give this question some thought in advance.

Is then the persistently Wassermann-positive syphilitic condemned to celibacy for life? Yes, if his positive Wassermann reaction is due to a focus in the central nervous system; if he is an asymptomatic paretic or tabetic, as shown by examination of his cerebrospinal fluid, because in that case the prognosis of his disease is hopeless; up to the

present time no paretic or tabetic has been cured, although symptoms have undoubtedly been ameliorated. But if the cerebrospinal fluid be normal, and the syphilitic focus be located in other viscera, the prognosis as to the cure of the syphilis, the prospects of rendering him permanently Wassermann-negative, are by no means hopeless. In other words, he may not be permanently Wassermann-positive but only unusually resistant.

At the present time there is frequent reference to the persistently positive Wassermann reaction, in a sense implying permanence of the reaction and, in accordance with our interpretation of it, incurability of the disease. A few years ago I was inclined to this view of the persistent Wassermann-positive, but the experience of the past few years had led me to modify my opinion. I have seen so many cases with persistently positive reaction finally become negative, and remain negative for a sufficient period to warrant the belief that the negative reaction is permanent and the patient cured, that I am strongly inclined to believe that every case of syphilis, excepting only those whose central nervous system is involved, can be cured. At present, however, this view must be regarded rather as the expression of a hope than as an absolute conviction. To illustrate: A man whose syphilis dates from the year 1897 received treatment by pills for eighteen months, married in 1900 with his physician's consent; came to me for treatment in 1912; asymptomatic; Wassermann reaction, 4+; wife and children syphilitic. It required three years of persevering, energetic treatment with salvarsan and mercury to bring about a negative reaction that has remained negative after a provocative salvarsan injection.

A man infected in 1901, treated systematically and well by injections and inunctions of mercury, came to me in March, 1910, with a gumma on the site of the former chancre. Wassermann negative, becoming positive after institution of treatment by injections of mercury which was continued

systematically till treatment with salvarsan was begun in February, 1911; repeated courses of salvarsan and mercury in full doses; Wassermann reaction negative in October, 1913, after three and a half years of most energetic treatment. Two more courses of salvarsan and mercury during the succeeding year, the Wassermann reaction remaining negative. Provocative salvarsan in December, 1914, followed by negative reactions. Spinal puncture in January, 1915, showed a normal fluid. The patient was married with my consent a few months ago.

The first case illustrates two points: (1) the physician's consent to marriage three years after infection, based on the absence of symptoms, was followed by disastrous results to the wife and children; (2) the persistently positive Wassermann reaction in this old asymptomatic syphilitic, finally became negative after patient and energetic treatment. If he had been treated to this degree before medical consent to his marriage had been granted his wife and children would have been spared. The second case is a good example of the persistent Wassermann-positive, who required nearly four years of intense treatment between the ninth and thirteenth year of his disease, to bring about a cure. I have now records of so many of these cases of old syphilitics who two years ago would have been classed with the persistently, meaning hopelessly, Wassermann-positives, that I strongly incline to the view that unless the central nervous system is involved no case of syphilis is incurable. (It is needless to say that I do not mean to imply that the injury already caused by syphilis can be repaired; an optic nerve atrophy or an aortic aneurysm will not disappear, though the syphilis that has caused these conditions may be cured.) Our duty then, to the Wassermann-positive asymptomatic syphilitic who aspires to marriage is to withhold our consent and insist on the institution or the continuance of energetic treatment until he becomes permanently Wassermann-negative. If the asymptomatic syphilitic

elects to take his chance and chooses to discontinue treatment, that is a matter that concerns himself mainly. A man may choose to leap into the river—if the police do not interfere—and take his chance of drowning before reaching the other shore. But on no possible ethical grounds has he the right to seize in his arms an unsuspecting girl and leap into the water with her, subjecting her to risks of which she knew nothing and about which her opinion was not even asked.

As to the syphilitic woman, she may marry without risk of infecting her husband as soon as she has passed the stage of active infectious lesions of the skin and mucosa, in general, even by the old methods of treatment, two or three years after infection; but she cannot bear children without the risk of bearing syphilitic children until she has become permanently Wassermann-negative. Pregnancy in the Wassermann-positive woman implies a risk for the fetus. We have discussed the nature and degree of this risk in the previous section. Our attitude as physicians toward the syphilitic woman is, as a rule, not difficult. The syphilitic woman is either a widow or a woman of loose morals; in neither case is the physician's consent likely to be asked. In the case of the girl who has an innocent extragenital infection, we may be sure that she will strictly conform to her physician's regulations and not assume the risks of wifehood and maternity until she is cured.

To conclude: The syphilitic may marry when he has had sufficient treatment to render his blood serum permanently negative to the Wassermann reaction and an examination of his cerebrospinal fluid shows normal conditions.

III. THE CONTROL OF SYPHILIS

The attempt to control the incidence of syphilis by segregation and examination of prostitutes has proved itself of such slight value that it may be said to be a failure. But

even if it had measured a far greater degree of success than its most ardent advocates claim for it, it has for us no practical value because a system of *reglementation* is so repugnant to Anglo-Saxon sentiments and traditions, which prevail in our country, that it could never be enforced. Forty years ago *reglementation* based on the Paris system was attempted in St. Louis, Missouri, but the sentiment aroused mainly by clergymen against this "compact with sin and Satan" soon led to the repeal of the law. The control of syphilis must come through education; education of the public in the risks and dangers of illicit intercourse and education of the physician in the importance of early diagnosis and proper treatment.

The education of the public is slowly making progress. Largely through the influence of the Society for Moral and Sanitary Prophylaxis, Public Health Associations and similar bodies throughout the country, parents and teachers are being aroused to the importance of the subject, and discussions as to methods of bringing a knowledge of sex questions to the youth of both sexes have led to the beginning of instruction on these subjects into many schools. It is noteworthy too that while up to six years ago the word syphilis had probably never been printed in an American newspaper, the disease is now frequently mentioned without circumlocution and has been the subject of discussion in popular magazines. The public is being educated.

How far a knowledge of the risks of venereal infection acts as a restraint is a moot question; the sex instint is, next to the desire for food, the strongest instinct to which the animal is subject. But while food is an absolute necessity for existence, no one is injured by abstention from sexual intercourse. "With all the force that any knowledge I possess," says Gowers, "or any authority I have, can give, I assert that no man ever yet was in the slightest degree or way the worse for continence or the better for incontinence." "Personal purity," says Osler, "is the prophylaxis which

we as physicians are especially bound to advocate. Continence may be a hard condition (to some harder than to others), but it can be borne, and it is our duty to urge this lesson upon young and old who seek our advice in matters sexual."

Every medical man will give his hearty endorsement to these opinions. But we must recognize the fact that we are dealing with one of the strongest human appetites; that prostitution is as old as historical records of the race; and that, in the complex structure of our modern industrial society, early marriage, the legitimate outlet for this appetite, is becoming more and more difficult. A vigorous inunction with a 33 per cent. calomel ointment applied within a few hours to the site of inoculation of the spirochete will absolutely prevent infection. On the basis of experimental observations, as well as statistics taken mainly from army and navy records, it is not too much to say that the systematic employment of this means of prophylaxis would soon result in reducing syphilis to the rank of one of the minor plagues of the world. The Great Pox could be as completely controlled by this means as the Small Pox by vaccination.

That syphilis is indeed one of the great plagues of the world must be admitted. Attempts at estimating the number of cases of the disease in a given community have been made in various centres of population with varying degree of probable error. Syphilis being a venereal disease in 90 per cent. of the cases, the incidents of the disease will vary with the state of sexual morality in a given community; but as it is a contagious disease for only a short period in its course, the likelihood of infection from a given case will vary with the promptness and thoroughness with which treatment is instituted and carried out. It will therefore vary in different strata of society, being more frequent *ad hoc* among the poorer classes.

Estimates of the proportion of syphilitics among the population of London, Paris, Berlin, etc., made before the Wassermann test was practised, are at best only more or

less good guesses. The best authorities estimated the number of syphilitics in these European cities as from 12 per cent. to 15 per cent. of the population. It is, however, only since the introduction of the Wassermann test that we have reliable information of the proportion of syphilitics; but unfortunately the tests have not yet been applied to sufficiently large and representative groups of people to give us more than a suspicion of the truth. Wassermann tests made on all patients admitted to Bellevue Hospital and to the Presbyterian Hospital in New York City showed a ratio of 20 to 25 syphilitics per 100 cases. Tests recently made on 4000 patients in the Peter Bent Brigham Hospital in Boston showed 600 positives, 15 per cent.; and in this institution there is no service for venereal diseases. Hospital statistics of syphilis cannot of course be regarded as indicative of the ratio of syphilis to the community at large because many of the cases seek hospital relief on account of their syphilis—heart, aorta, central nervous system, etc.; the hospital ratio will be too high. The following statistics of the Health Department of New York City are of interest:

	No. of tests.	Positives.	Per cent.
Tombs Prison (men awaiting trial) . .	391	45	11.5
Hart's Island Reformatory (boys) . .	544	37	6.8
Penitentiary, Blackwell's Island (both sexes)	253	62	24.5
Workhouse (both sexes)	2621	1209	45.7
	3809	1353	35.0

Among these 3809 cases from the criminal, degenerate and derelict class, including a considerable number of prostitutes in the workhouse, 35 per cent. have syphilis. Among 191 young girls in the Bedford Reformatory, wayward girls and youthful prostitutes, 78 or 40.8 per cent. have a positive Wassermann reaction.

These figures, like the hospital statistics, cannot be applied to the general population. Considerably more value may

be attached to the results obtained on examination of 1107 applicants for peddlers' licenses in New York City among whom 91 (8.2 per cent.) gave a positive Wassermann reaction. The figures for peddlers correspond fairly well with the reports of Reasoner and Bartlett of the United States Army Medical Service, who found in two regiments 7 per cent. and 10 per cent. of Wassermann-positives respectively. Collating the statistics from the army and the applicants for the peddlers' licenses with those obtained from three representative hospitals, and bearing in mind the fact that the positive Wassermann reactions represent less than the actual number of syphilitics because many syphilitics may have been Wassermann-negative at the time of the examination, we arrive at the conclusion that not less than 10 per cent. and not more than 20 per cent. of the population is syphilitic. An allowance must be made for the fact that syphilis is more frequent among men than among women, in my clinic, in the proportion of 100 men to 40 women, and that a large number of cases upon which these Wassermann statistics are based were men (army and peddlers) while the sexes are about evenly divided in our population. On the other hand, the army statistics probably give too low a figure, because a man with definite lesions of syphilis will not present himself to the recruiting officer or will be rejected at the first examination; and the great majority of the 1107 applicants for peddlers' licenses examined in New York City were Jews, among whom syphilis is less frequent than among the general population. With due though indefinite allowance for these corrections we may arrive at a figure for the ratio of syphilitics to the general population of approximately 10 to 15 per cent., a figure which accords very well with the estimate made many years ago for several European capitals. After all it matters little for our purpose whether the ratio is 10 per cent. or 15 per cent. It is enough to know that an appalling number

of syphilitics are to be found in our population. Even on the minimum basis of 10 per cent. of syphilis among adult males and 4 per cent. among females we should arrive at a total of about 3,000,000 adult syphilitics in the United States. I regard this as a conservative estimate.

When we bear in mind the terrible significance of an infection with syphilis in connection with the wide diffusion of the disease, the problem of its control seems well worth our most earnest consideration. In addition to prophylaxis and a wider knowledge of the dangers of the disease, the most important agent in its control lies in the hands of the physician. It is an unfortunate fact that the treatment of the disease on the part of the general practitioner who comes in contact with the greater number of syphilitics is lamentably inadequate. Up to five years ago it was a common thing to hear from the syphilitic who came to us with one of the grave lesions of the late stage of his disease: "Yes, I had a sore ten years ago; the doctor thought it might be syphilis, but wasn't sure; he cauterized it and gave me some pills which I took for a few weeks. I never had any trouble until now." I venture to say that every syphilidologist of experience has heard just these words a hundred times. It means, of course, that the doctor did not make a diagnosis and did exactly what he should have not done in giving the patient treatment which was of no avail except to disguise further symptoms, for a time, and make a diagnosis impossible; and finally did not impress on the patient the serious character of the disease from which he might be suffering and the necessity for further observation until a diagnosis was possible. I know that very often the doctor told the patient that it was not possible to make a positive diagnosis, and correctly advised waiting for corroborative signs, advice which the patient did not follow, overlooking the mild roseola and failing to present himself again. The fault in these cases, however, must frequently be laid to the physician, for surely a proper

presentation of the case would have impressed the patient sufficiently to lead to a different result. Unfortunately, most physicians are afraid of being regarded as "alarmists;" afraid to tell the patient the truth concerning his suspicions, and afraid, also, if a positive diagnosis has been made, to impress on the patient the grave nature of his disease and the necessity for prolonged treatment even in the absence of symptoms. I should rather risk making one unhappy syphilidophobe than permit ten syphilitics to neglect their treatment with all the possibilities of a neglected syphilis.

Ten years ago a positive diagnosis of syphilis in the primary stage was frequently impossible, and it was a wise rule to wait for the development of early lesions of the skin or mucosa before undertaking treatment. Today, however, we can always make a positive diagnosis of syphilitic chancre by means of an examination for spirochetæ. How many physicians are able or technically prepared to make this examination? Shall I say one in a hundred? I should say that this estimate is a gross exaggeration. And yet in view of the paramount importance of early diagnosis, diagnosis from the chancre before the great diffusion of spirochetæ through the system, should not every physician be prepared to make this examination, or at least realizing its importance, employ the services of a laboratory to have it made? The enormous literature of the last five years unhappily has seemed to pass over the heads of most physicians without much impression. But the enlightened physician will tell you that though he does not examine for spirochetæ he regularly makes use of the Wassermann test and always gives salvarsan. I could fill a volume with the narrative of the failure to really comprehend the meaning of the new methods on the part of the "enlightened" physician. One example may suffice. A man came to me with a chancre which he had noticed two days before, ten days *post coitum*. An examination of the typical chancre revealed spirochetæ. I told the patient that he had syphilis, and that as his older

brother had tabes with optic atrophy, I need not dwell on the seriousness of the matter, but that in this early stage he would probably be cured very readily. I made an appointment with him for the next day for excision of the chancre and injection of salvarsan, and meanwhile applied a compress of bichloride solution to the sore. He did not keep his appointment. Three days later he telephoned me that he had discussed the matter with his family physician, who had told him that he would like to have a Wassermann test and another examination for spirochetæ. This had been done and both examinations were negative. So he guessed I was mistaken. The poor doctor did not know that the Wassermann reaction is always negative so early after infection and that the bichloride dressing would make the search for spirochetæ futile. Three months later the patient had his roseola. By the delay in instituting therapy the patient lost the golden opportunity for abortive treatment of his disease.

As to salvarsan, except in the hands of a relatively few specialists, the introduction of this marvelous remedy has been of very little real use. It seems to me that the use of salvarsan by physicians in general bears about the same relation to the proper treatment of syphilis as did the pills and iodide of a decade ago. The "up-to-date" physician gives salvarsan, but he commonly limits himself to one injection, or he may give several injections at remote intervals. A clear-cut, well-planned course of treatment is the rarest event in the history of the average syphilitic. The worst sinners in regard to the treatment of syphilis, I am sorry to say, are very often at the head of the profession in their own field of work. The eye lesions and the throat or bone lesions that are brought to the specialists in their appropriate field are, for the most part, treated until the lesion disappears and the patient is left with his syphilis, his underlying constitutional disease uncured. The patient receives mixed treatment, or possibly an injection of sal-

varsan; but does the ophthalmologist, the laryngologist, or the surgeon concern himself with the treatment of the asymptomatic syphilitic, the man whose only symptom is a positive Wassermann reaction? Certainly not! In most cases he would indignantly repudiate the idea that he treats cases outside the field of his specialty. But the poor syphilitic is the sufferer; he carries his uncured syphilis until a fresh lesion, this time perhaps an incurable condition, brings him again to a physician.

These are unpleasant truths, and it is not an agreeable task to state unpleasant truths; but the truth must be told, for it is only by knowledge that we can hope for improvement. What is the remedy for the prevailing ignorance and bad treatment of syphilis? Manifestly, better education; education in the medical schools and in the hospitals. As long as syphilis is taught in the schools by its individual symptoms as syphilis of the eye, the skin, the liver, the nervous system, etc., by a dozen different professors in a dozen departments, instead of being taught as a systemic disease affecting the whole body, just so long will it be badly taught. The teaching of syphilis should be the work of one man in the faculty of the medical school; only thus can a proper understanding of the disease as a whole be brought home to the student. The syphilitic lesions of the eye, the bones, the central nervous system, etc., will properly come under the purview of the ophthalmologist, the neurologist, the surgeon, etc.; but in these departments the instructor should concern himself only with the diagnosis of the special lesion. Does the ophthalmologist administer the treatment for diabetes to the patient in whom he has recognized a glycosuric retinitis, making the complicated metabolic determinations necessary for a correct therapy? No, he sends the patient to the internist, because he knows that he is incapable of treating the case properly, and because there is no simple remedy at hand like potassium iodide to cure the lesion. Nor does he deliver a lecture on the general

pathology of diabetes; that is the function, he realizes, of the internist.

In our hospitals in which the education of the physician is continued the same conditions prevail in regard to the treatment of syphilis. Every ward of the hospital has its syphilitics, and their treatment depends upon the whim of the various medical men in charge who are usually interested only in the existing lesion of their patient. The hospital has no room for the asymptomatic syphilitic and the patient is dismissed as soon as the lesion is cured and very often as soon as the diagnosis is made. No attempt is made to rid him of his constitutional disease. Indeed, if the patient presents the infectious lesions of the early period he is generally refused admission to the hospital. A school teacher living in a boarding house in New York innocently acquired a chancre of the lip. It was impossible to place her in any hospital ward in this city, unless she were willing to go to the City Hospital and mingle with the dregs of the metropolis found in that institution. Such a state of affairs is simply a blot on our medical institutions, and I am informed that similar conditions in regard to the admission of syphilitics with contagious lesions prevail throughout the country. The contrast between the lack of beds for the frank syphilitic in American hospitals with the generous provision made for this unfortunate class in Europe is striking. The hospitals of the large cities on the Continent recognize the importance of hospital accommodations for the syphilitic. The Hôpital St. Louis in Paris, with 2700 beds for skin and genito-urinary diseases, the Rudolf Virchow Krankenhaus in Berlin with 500 beds for skin and venereal diseases, constitute only a portion of the total beds for this class provided by the various hospitals of these cities. The smaller cities of the Continent are not less liberal in their provision for hospital treatment of the disease. If our American hospitals would set aside only 5 per cent. of their beds for cases of syphilis, exclusive of those with visceral or surgical lesions who may be placed

in the general wards, the immediate needs of this class of patients would be at least partly met.

Syphilis, however, is for the most part an ambulatory condition, and the patients are treated in the dispensary rather than in the hospital. What conditions as to diagnosis and treatment of this important disease are to be found in our dispensaries? Three years ago an association of all the out-patient clinics of New York City was organized for the purpose of regulating and standardizing their methods of treatment, conditions of the service, etc. An advisory committee, consisting of representatives of the dermatological and genito-urinary services of these institutions, drew up the recommendations for these departments with special reference to syphilis and gonorrhea. They recommended that all cases of syphilis, whatever the nature of the lesion, be treated in one department; that this department be either a special department for syphilis or the dermatological department; that facilities for early diagnosis (dark-field microscope) and for the Wassermann test be provided, and that salvarsan be administered gratis to those unable to pay for it. How have the out-patient clinics of this city responded to these recommendations? There are at most two clinics among the sixty in the city in which all the demands of this committee of experts have been fully complied with. Salvarsan is either not given at all or given only to those able to pay for it; the dark-field microscope is an almost unknown instrument; the syphilitic in most institutions continues to receive the treatment accorded in the department to which his particular lesion first led him.

Conditions throughout the country are in no respect better than those prevailing in this city. Here and there may be found a few dispensaries in which the personality of the head of the department in which syphilis is treated has prevailed over the indifference of governing boards, just as it has in a few instances in New York, and brought about conditions which are very nearly, if not quite, up to the

standard requirements. But everywhere there is on the part of the ruling powers of our institutions an attitude of indifference or *laissez faire* in regard to the disease which is probably the most frequent and the most important of all the diseases that affect the beneficiaries of these public institutions. It must be brought home to the authorities of our hospitals and dispensaries that they are derelict in their duty when they fail to give every possible aid that science affords to the victims of any disorder that seek their aid. To do less is often to rob the confiding poor man of his chance of health or life. Is it too much to characterize as criminal negligence the failure to provide the means for diagnosis and treatment of the early syphilitic demanded by modern methods when, on the one hand, the application of these methods in most cases means prompt cure of the disease and a reduction of the chances of infection of others, and, on the other hand, the neglect to provide them means, possibly a hopeless cardiac, a paretic or a blind tabetic, or an infected wife and syphilitic children constituting an endless chain of misery? These ruined lives in turn become a charge on the community, and thus the economic waste resulting from the improper treatment of the early syphilitic is simply incalculable.

In every community the hospital is a powerful force in the education of the physician. If our hospitals and dispensaries were properly equipped for the treatment of this disease the influence of their example would lead to better methods among physicians in general. If every case received proper treatment at the inception of the disease, syphilis would be robbed of half its terrors, and through the prompt elimination of the contagious element the opportunities for the spread of further infections greatly reduced. We have then in our hands a powerful agency for the control of syphilis.

Would that everyone who reads these words might make it his particular business to use his influence with hospital and dispensary boards to bring about better conditions for the treatment of syphilis!

SYPHILIS OF THE INTERNAL GENITAL ORGANS IN THE FEMALE

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Introduction

The discovery of the Spirocheta pallida and the development of the Wassermann reaction have introduced new viewpoints into the study of syphilis and have served as fruitful stimulants to original research. Though the new era of syphilology dates back less than a decade, it has led to notable advances in almost every branch of medicine. In contradistinction to the sister science of obstetrics, gynecology appears to have availed itself to a lesser degree of the advantages offered by these new possibilities, and it has seemed to us the propitious time to collect the available data, to sift critically the accumulated mass of evidence, to put on record personal observations and investigations, and to present the results in the hope that future workers in this field may find them convenient as a basis upon which to pursue their studies.

In preparing this report it soon became apparent to us that a discussion of syphilis of the internal genital organs in the female would embrace separate considerations of a number of questions which were directly or indirectly related to our subject. Thus the chapters on differences

of syphilis in men and women, the relations between syphilis and cancer, the infectiousness of physiological genital secretions and others were added to the chapters dealing with syphilitic manifestations in the various parts of the genital tract.

The literature on our special topic and correlated subjects is extremely voluminous. But as by far the greater part of the publications studied antedated the advent of modern diagnostic methods and the changes wrought by them in our conceptions of the disease, it became clearly necessary to observe throughout a critical attitude toward observations and opinions of previous authors. Our willing recognition of the merits and admirable writings of many of the path-finders in our special field has not suffered from our desire to ascertain actual facts and to reject incomplete information, generalizations, and vague theories. This may explain and excuse the note of scepticism which may be noticeable here and there in this paper. We realize that we may have refused to accept statements only because they did not seem proved to us, which in the light of future knowledge will count as established facts.

Very early in our literary studies we became impressed with the unreliability of quotations which were passed on from one author to another. Names and titles, in many instances, were misspelled almost beyond recognition. Mere suppositions, incomplete reports, and unreliable observations had, by continuous transfer from one paper to another, finally attained the dignity of well-established and important facts. Lancereaux's case (No. 55) is an example of such misinterpretation; likewise, Wyder's report on endometritis exfoliativa which is discussed in detail in Chapter VI. Authors were credited with a large number of personal observations while, in reality, their contributions consisted almost altogether of compilations of literature.

On account of these and other shortcomings, a consistent

attempt was made on our part to consult only original publications and to establish, for ourselves, the validity of any claims made, and only if the originals could not be procured did we make use of quotations or abstracts. In the latter event the sources of our information have been succinctly stated.

In any empirical science such as medicine we learn through our own experiences and those of others, and thus our knowledge is directly based upon case reports in literature. Of these we have made a collection of 147 which probably represent not all such records but unquestionably include all the important ones. We have abstracted these reports in more or less detail so as to give the reader an opportunity to form his own judgment of the value of each report. In order not to disturb the continuity of thought by citations of histories and to avoid repetition, these case reports have been arranged in alphabetic order of the authors' names in Chapter XIV and in the text will be referred to by their respective numbers. The year of publication is given with the name of the author thereby giving the critical reader familiar with the history of syphilology additional information which will enable him to gauge the value of the contribution.

Our studies began three years ago. In addition to our private clientele, we have had at our disposal for purposes of investigation the large material in the St. Louis City Hospital, City Sanitarium, and the Barnard Free Skin and Cancer Hospital. Of the numerous observations made we present 18 in the course of this paper in order to illustrate certain points.

It is a pleasant obligation to acknowledge our appreciation of the cordial support we have enjoyed from Dr. F. A. Baldwin and Dr. C. W. Schery, at the City Hospital Laboratory, and Dr. George M. Smith at the laboratory of the Barnard Hospital.

Chapter I

THE HISTORY OF SYPHILIS OF THE FEMALE GENITAL ORGANS

The history of syphilis, as far as our special subject is concerned, probably begins with Ambroise Paré (1510–1590), who, according to Pusey, employed the vaginal speculum, by means of which he studied vaginal and uterine lesions of venereal diseases. The first consideration, in literature, of syphilis of the female genitalia dates back to Astruc in 1736. Lancereaux, in 1864, devoted two chapters of his book to a discussion of our topic and collected the literature up to that date. Lancereaux and Fournier (1881) are the two great pioneers in the problem of syphilis of the internal genitals in the female. Neumann's work (1896) represents the latest exhaustive study of this question. The literature up to 1907 has been reviewed comprehensively by Herxheimer.

Of contributors to special parts of our subject, Heitzmann who deserves first mention, published in 1879 colored illustrations of syphilitic manifestations of vagina and cervix. These pictures, with many additions, were later embodied in the Atlas of Oppenheim (1908), who also gave particular attention to the differential diagnosis of genital syphilis in the female. Syphilis of the cervix was studied by Mrazek (1881), and Rille (1904); syphilis of the uterus by Morisani (1901), Muratow (1907), and Jaworski (1911). The luetic affections of the tubes were discussed by Wassilieff (1904) and Dalché (1905); while Ozenne (1904) paid particular attention to the syphilitic ovary. The general consideration of tertiary lues of the internal genitals is connected with the names of Barthélemy (1900), Franceschini (1906), and Laffont (1908). In 1913, P. Meyer revived the

interest in our problem by a general survey of the situation and was seconded, in this country, by Chase (1913), who presented an extensive translation of Meyer's paper. The most recent original investigations are those of Whitehouse (1913).

In addition to these individual contributions, syphilis of the internal genitals has been the subject of discussion before two congresses. At the Internal Medical Congress held in Rome in 1900, Barthélemy delivered the official report (published in 1905). At the Congrès national periodique de gynécologie de Rouen (1904), Ozenne, Robineau, Jeanne, and others participated in a symposium.

In glancing over these names we must acknowledge, with some degree of humiliation, that the most important contributions to our subject have come from the pen of dermatologists (Fournier, Neumann, Mrazek, Rille, Oppenheim, etc.), but it may console us to a certain extent that the first confirmation of Schaudinn's discovery was supplied by the gynecologist Paschen who found spirochetes in a cervical chancre.

The earlier stages in the study of syphilis were dominated by the doctrine of Astruc (1736) and his contemporaries, that syphilis and gonorrhea were identical. Balfour (1767) energetically opposed this teaching and found supporters in Tode, in Denmark, and Ellis, in England. He did not, however, prevail against the great authority of John Hunter who firmly believed in the unity of the two diseases and, to establish his theory, inoculated himself in May, 1767, with pus presumably from a gonorrheal lesion, but had the misfortune to infect himself with syphilis.

Hunter's wrong conceptions prevailed despite occasional opposition (*e. g.*, Bell) until the fourth decade of the nineteenth century when Ricord, in 1837, established the foundation of our present clinical knowledge of syphilis. In his classical book published in 1838, Ricord clearly differentiated

between blenorrhagia and other venereal diseases, though he still confused soft and hard chancre. The division of syphilitic infection into three stages is Ricord's work. Gynecology owes much to him, for it was he who revived the use of the vaginal speculum and described carefully lesions of vagina and cervix.

The further development of syphilology was based upon the influence of Ricord and his disciples, and the advances made cannot be overestimated. It was, however, left to our own days for a triad of brilliant achievements to usher in a new era and elevate the study of syphilis to the plane of an exact science: the discovery of the Spirocheta pallida by Schaudinn and Hoffmann in 1905, the introduction of the Wassermann test in 1907, and the perfection of chemotherapy by Ehrlich in 1909.

Chapter II

THE DIFFERENCES OF SYPHILIS IN MEN AND WOMEN

The enormous extent to which syphilis exists has, for obvious reasons, never been fully ascertained and probably never will be. Chase mentions statistics compiled prior to the advent of the Wassermann reaction, which give the number of syphilitics as more than 2 per cent. of the population in the United States and more than 5 per cent. of that in Germany. More recent estimates show much higher figures. Pusey, quoting Erb, states that 12 per cent. of the adult male population of Berlin is syphilitic. Le Noir estimated for Paris that the proportion of syphilis in the adult male population was not less than 13 per cent., probably nearer 15 per cent. Fournier's estimate for Paris was 13 per cent., and for London 12 per cent. Pinkuss claimed that one man in five in Germany has had syphilis. Barrett,

in a Wassermann survey of practically all patients attending for four months at an eye and ear clinic in Melbourne, Australia, found 14.4 per cent. syphilitic. Vedder and Hough estimate that 10 per cent. represents closely the prevalence of syphilis among men in the United States. Enormous as these figures are, they will, in all likelihood, prove to be but fractions of the actual numbers of syphilitics when the Wassermann reaction will have become a more generally applied test than has been possible in the nine short years since its discovery.

As to the comparative frequency in respect to sex, it is generally accepted that syphilis is considerably commoner among men than among women. Rejecting exaggerated estimates, Pusey thinks that among the former it is probably two or three times as frequent. This coincides rather closely with the report of the Royal Swedish Commission which, in 1914, found in Sweden 1426 men and 688 women syphilitic. Hubert, on the other hand, who in all clinic patients inquired into the history of possible syphilis and made routine Wassermann tests, found in 8652 patients 759 cases of luetic infection (8.8 per cent.); of these 8652 patients there were 4739 men with 405 infections (8.5 per cent.), and 3903 women with 354 infections (9 per cent.). There is, then, at least a possibility that the prevalence of syphilis among women is not as low as has been assumed.

But be that as it may, the fact stands out boldly that so enormous a number of women are afflicted with syphilis as to constitute a gynecologic problem in the widest sense. It is not enough to record, study, and treat syphilitic manifestations in the several female organs with which we as gynecologists are concerned, but it also behooves us to consider from a higher point of view the influence of syphilis upon the entire organism of woman as contrasted with that of man. Just as the neurologists and psychiatrists are confronted by a problem essentially their own, so must

we learn to recognize syphilis as a factor in gynecologic pathology which hitherto has not been generally appreciated. To be sure, there have been sporadic expressions in this direction. Muratow has suggested that a large percentage of gynecologic affections is, perhaps, of syphilitic origin. Ozenne has realized that an intercurrent syphilitic infection may aggravate existing functional disturbances or inflammatory processes within the genital sphere of woman; and Siredey has advised a trial with specific treatment before any operative intervention in all cases of inflammatory processes in the uterus and adnexa if rest in bed and the usual antiphlogistic regime has failed to improve the condition.

But as a whole, the chapter on syphilis in the female has yet to be written. To disarm any objection as to uncritical generalizations, we declare ourselves in hearty accord with Renault who points out that a positive Wassermann does not justify, *ipso facto*, the conclusion that any co-existing disease is syphilitic in nature, particularly if visceral lesions are concerned. "In view of the enormous number of syphilitics in the world, it is not surprising that a positive Wassermann is so often encountered. The positive outcome of the reaction simply indicates that the subject is tainted with syphilis, and that is all. This taint by no means excludes the possibility of other diseases."

This taint, however, is more than a harmless coincidence. If we define, with Cohnheim, disease as the abnormal course of the same processes which represent the manifestations of life in the healthy state, we can see at once how such a pathologic physiology must be still further complicated by the addition of syphilis. It is, therefore, of importance to us to know not only the effect that syphilis directly produces in the gynecologic field but also the effect it has upon other gynecologic diseases.

As a corroboration of our contention the highly suggestive

statistics of McIlroy and Watson may be mentioned. Of 100 patients of the gynecologic dispensary, in whom well-defined gynecologic ailments had led to more or less serious disturbance of general health, only 6 gave a history of syphilitic infection; yet Wassermann, made in all cases, was positive in 43, negative in 48, and doubtful in 9 cases—an amazing prevalence, indeed, of latent syphilis in gynecologic patients who represented the respectable working classes. This latency of syphilis which is a striking feature in women has been mentioned by various writers. Hubert, for instance, found in 759 cases, in which a positive Wassermann had revealed the presence of syphilis, that 52 per cent. of the men and fully 75 per cent. of the women gave a negative history of infection.

This distinguishing feature leads us to the second reason why we need a separate chapter on syphilis in the female. In woman the disease exhibits certain peculiarities that are not met with in man.

It is undoubtedly true that the want of information as to incubation and development of the infection in women is often due to their ignorance. We have only commenced to introduce into the instruction of the young a frank discussion on matters of sex hygiene. The majority of patients with whom we are dealing, and shall deal for years to come, still are the products of a hypocritical form of education which made Truth subservient to so-called Decency. Are we doing our full share in dispelling the mists of false modesty? Shillitoe is quite right in saying that in by far the majority of cases it is (we would prefer *it seems*) impossible to discuss the conditions in the same open way as with men. Indeed, it not infrequently happens that we are asked to, and do, treat a woman for the whole course of the disease without perhaps once mentioning the word syphilis, or giving her any inkling as to the true nature of the ailment from which she is suffering.

It does not seem necessary to accuse women of intentional deceit, as Renaul does when discussing the various difficulties of obtaining reliable histories. "Do not forget," says Renaul, "that Beaumarchais correctly described woman in saying, 'her natural instinct is to deceive' "—and that from a Frenchman!

While in men the primary lesion is usually noticed by the patient and found by the physician without any difficulty; and while in men the primary sore leaves unmistakable traces behind which may persist for a long time, the opposite is true in women. Indeed, the search for the primary sore, however careful and thorough, has so often remained futile, that for years the view has gained a foothold that syphilis may exist without previous occurrence of an initial lesion. The French have coined the term *syphilis d'emblée* for this condition. More than half a century ago Ricord disputed the correctness of such a view, which would be contradictory to all our conceptions of the pathogenesis of syphilis, and more recent literature has multiplied his objections. Almkvist, in a critical review, admits the existence of *syphilis d'emblée* only in 4 cases; all of these concerned surgeons who became infected while operating. None of the remaining 23 cases on record is conclusive, and he cites an observation of his own, that of a man in whom long and painstaking search finally revealed the primary sore within the urethra. Neisser's successful inoculations into the blood of apes without the production of a chancre differ too much from clinical conditions to change our views.

Two factors contribute to the difficulty of demonstrating initial lesions in woman. The female genitalia being more complex than the male, the sore might be established in some concealed location and thus escape discovery. Further, the primary lesion clears up more rapidly in women than in men. Only if situated on cutaneous surfaces about the

genitals, does the chancre in women present the typical induration with which we are familiar in male patients. Upon mucous membranes the parchment-like induration of the base is usually absent and can only very occasionally be elicited. To this small category belongs the famous and oft-cited case of Ricord, where a primary sore was discovered upon the cervix of a prolapsed uterus. Chancre in women is smaller than in men. The ephemeral nature of the primary lesion in women is so pronounced that, to speak with Shillitoe, in a marked case of secondary syphilis, a medical man need have no doubt as to the correctness of his diagnosis because he has failed to discover the original sore. According to Thibierge, chancre of the cervix so often heals rapidly without leaving any trace behind that one may well ask whether a number of supposedly hereditary infections have not in reality been due to a cervical sclerosis which has escaped detection. Palmer has examined 600 syphilitic women, in most of whom the time of primary infection was known, and found that visible signs were insignificant irrespective of whether or not the patients had received treatment. On an average, the scar of the primary lesion was recognizable for six months in the form of a purplish or brownish discoloration, if located on the epidermis of the external genitals, while on the mucous membranes it had completely disappeared before this time.

The transient nature of syphilitic affections of the genital mucosæ in women seems to prevail throughout the course of this disease, and Palmer found that even deep ulcerative syphilids of the cervix leave, as a rule, no scars as typical as those of syphilitic ulcerations in other mucous membranes. The different behavior of the mucosa of the mouth in men is frequently cited, and the even temperature and humidity in the vagina and the absence of friction and of thermic or chemical irritation have often been quoted as favorable toward the limitation and complete resolution

of luetic manifestations. La Mensa even believes that these conditions in the vagina produce a sort of "relative immunity," for among 3257 syphilitic women examined, only 675 had genital ulcers, while 2027 presented lesions in the oral cavity.

The general health may be little affected during the eruptive stages of the disease; a man may present a well-marked exanthem and yet feel perfectly well. For some reason, which cannot yet be explained, the female sex seems to suffer more than the male. Fever and anemia are commoner in women than in men, and especially in young women (Andrewes).

One of the most striking differences of syphilis in men and women is the relative frequency of tabes and paresis in the two sexes. Pusey quotes Fisher, who found in 1178 men a total percentage of 3.7, and in 888 women a total of 0.55, who developed one or the other of these dreaded complications.

While it has long been known that paresis and tabes are much more frequent in syphilitic men than in syphilitic women, the explanations of this curious phenomenon have never risen above the level of conjectures. Very recently, some light seems to have been thrown upon this obscure problem.

Ever since Wallace, of Dublin, in 1834, introduced iodide of potassium into our specific therapy, it has proved itself invaluable in tertiary syphilis. Quite lately, Short made the noteworthy observation that thyroid extract was just as effectual as iodide of potassium in healing tertiary syphilitic ulcers. It is upon these investigations that Montgomery bases the following interesting deductions:

1. The thyroid is more active in females than in males, as shown by the frequency of its enlargement in females and by the much greater number of cases of Basedow's disease in females than in males.

2. A principal constituent of thyroid secretion is iodothyrin.

3. All the iodine compounds exert a marked influence on syphilis.

4. The influence of iodothyrin, although small, would be exerted continuously and for a long time, and it must be remembered that some of the greatest phenomena in nature are produced by small causes acting through a long time.

5. The course of syphilis and especially of neural syphilis is very different in men and in women, and this difference may be due to the greater activity of the thyroid, in women, so modifying the virus that it does not affect the nervous system.

It seems to us that these conclusions could easily enough be verified by paying particular attention to the condition of the thyroid in paretic and tabetic women.

As we now approach our special subject, syphilis of the internal genitalia of the female, we find ourselves confronted by a number of problems which are still waiting solution.

To begin with, there is the question whether or not a woman may be infected by the seminal fluid of a syphilitic man even though the penis bears no luetic lesion. Leaving out of consideration the so-called sperm infection in congenital lues which has given rise to the law of Colles, we believe that transmission of the disease by means of the sperma is quite within the range of possibility, a point asserted by Mrazek in 1881 and before him by Johns as early as 1855. While, according to Metchnikoff, up to 1914 spirochetæ have not been found in the seminal fluid, they have been demonstrated in infected human and animal testes. Hoffmann depicts, on Plate XXV, Spirochetæ pallidæ in the inflamed testicle of a congenitally luetic child. The spirochetes are present in enormous numbers not only in the interstitial tissue but also between the epithelial cells and in the lumen of the tubules. In acquired syphilis

of the adult, specific orchitis and epididymitis more often occurs in the tertiary stage, but occasionally appears as an early secondary manifestation.

The final proof was furnished by animal experimentation. Neisser succeeded in inoculating the skin of monkeys with the parenchyma of testicles of other infected monkeys. Siegel had the same success. Finger, finally, had two positive results in infecting monkeys with the sperma of luetic men.

It is, then, permissible to conclude, with Bab, that any portion of the entire female genital tract may be infected by the sperma, and the syphilitic virus may even reach the peritoneal cavity by way of the tubes. That spirochetes have not yet been found in the testes of adult man, and that the virus may have been added to the sperma from the prostate or during the passage through the urethra, does not vitiate our conclusion. Pusey's elimination of the semen as a possible source of infection may yet have to be revised.

The motility of the spirochetes renders spermatic infection even more plausible, a point to which Graefenberg and Trinchese have called attention. It is conceivable that this locomotion of the spirochetes may enable them, even as the spermatozoa do, to travel upward and against the current caused by the cilia of the uterine and tubal mucosa.

It is a matter of general knowledge that the manifestations of syphilis vary in different cases. Why are certain organs or tissues more susceptible to luetic infection? Does a predilection of the Spirocheta pallida exist for certain organs? A satisfactory answer to these questions is still outstanding and we cannot yet explain why the different parts of the female genital tract show variations in the frequency of luetic affections. It is, however, interesting in this connection to note the affinity of the spirochete of the African form of relapsing fever to the ovary of the tick

which has sucked infected blood, whereby the parasite is transferred to the next generation of tick as a preparation for further human infection (Andrewes).

The variation in the structures affected in different cases may be due to a variation in the strain of spirochetes to which, among others, Fordyce has recently alluded. The explanations offered are largely conjectural unless we accept as final the findings by Noguchi of certain definite differences in the morphological character of different strains isolated. These led him to divide the various specimens of pallida into the thicker and thinner forms and an average or normal form, the last being the most common and frequent.

The foremost impression the reader is likely to receive from the study of the material collected in the clinical part of this paper, will be one of surprise at the incompleteness of our actual knowledge. The dearth of observations of luetic lesions of the internal genitals contrasts strangely with the immense prevalence of syphilis in women at large. Is this merely due to insufficient attention on the part of the profession, or is there, perhaps, a factor inherent in the inner genital organs which endows these structures with a relative immunity?

The glorious discovery of Ehrlich has demonstrated to us the spirocheticidal affect of arsenic. The physiologic role of arsenic in the household of the body has been brought forcefully to our attention in the last fifteen years. We take in arsenic with our food and through the lungs (coal smoke, illuminating gas). Gautier, in 1900, found that, aside from iodine, the thyroid contains arsenic, which leaves the body of the male in the urine, while in the female it is largely eliminated in the menstrual blood; other blood does not contain arsenic. Hertoghe, in 1909, confirmed these findings and added that more arsenic is at times discharged in the premenstrual secretions of the uterus than in the menstrual blood; the postmenstrual secretions were free from arsenic.

Ries-Imchanitzki, in 1912, demonstrated that arsenic was stored up physiologically in the endometrium and discharged at menstruation, when the accumulation approached a toxic amount. Frommer, finally, made extensive investigations of a number of organs and confirmed the above observations; he found traces of arsenic also in the ovaries.

It seems to us that these investigations should demand attention in connection with our subject. It is, of course, mere speculation to surmise that the arsenic normally laid up in the internal genitals has a protective, or at least restraining, influence against the invasion of the spirochetes. We have commenced a series of experiments to find out whether menstrual blood of syphilitic and healthy women shows any differences as to the quantity of arsenic secreted, and we shall report our findings in a later publication.

SUMMARY

It is at present impossible to estimate even approximately the full extent to which syphilis exists in the world. The latest statistics, which tend to show that 10 per cent. of the male population of the United States are affected, are probably far too conservative.

Syphilis has always been assumed to be considerably commoner among men than among women; but from certain investigations mentioned above this supposition cannot yet be accepted as conclusive. At any rate, syphilis is common enough in women as to constitute a gynecologic problem in the widest sense. Not every disease in a syphilitic woman is syphilitic in nature, but syphilis if present will exert an influence of its own upon

coexistent diseases. Moreover, latent syphilis prevails more in women than in men.

The course of syphilis in men differs in many points from that in women. To instance but one of the differences mentioned, the relative frequency of tabes and paresis in the two sexes is well known.

Syphilis of the internal genitals in women presents a number of problems as yet unsolved. The question of infection by the sperma of a syphilitic man is discussed; as is, also, the possibility of differences in the strains of spirochetes which might have a predilection for one or the other part of the female genital tract. There is, finally, the question whether certain parts of the genitalia possess a sort of relative immunity.

Chapter III

The Histopathology of Syphilis of the Female Genital Organs

The classification of syphilis into three stages is still in common usage, although it is generally recognized that, from a clinical standpoint, a clear distinction between the secondary and tertiary stages is frequently impossible. The histologic study of syphilitic lesions shows plainly that there is no essential difference between the various luetic manifestations throughout the course of the disease. A discussion of the general pathology would obviously exceed the scope of this paper, and only certain histologic details will be considered in order to avoid repetitions in the text.

Syphilis, in many respects, resembles infectious diseases, such as measles, scarlet fever, typhoid, and smallpox, and differs from them mainly in point of chronicity. It is, how-

ever, better classed with the infectious granulomata of the type of tuberculosis.

The primary sore owes its origin to the inoculation of the Spirocheta pallida into a minute lesion or abrasion of a surface covered by squamous epithelium. The affinity of the parasite to this kind of epithelium is so marked that chancres have hardly ever been observed on other epithelial surfaces although this possibility must be acknowledged theoretically. At the point of entrance the slowly-growing parasite produces a reaction on the part of the endothelial and connective-tissue elements, *i. e.*, the fixed cells of the tissues, while polynuclear leukocytes, which ordinarily constitute the vanguard of bodily defence, play a minor part in the process.

The finer structure of the chancre is the same, wherever encountered in the body, subject only to modifications by the tissue affected. "The chancre shows in its very early stages a new formation of capillaries, with an infiltration about these and the preëxisting ones, of lymphocytes and plasma cells. If a lesion is examined in the early stages the infiltration is found sharply limited; in the later stages it is diffusely scattered throughout the corium. The endothelium of the capillaries is swollen and proliferated so that the lumen is narrowed or altogether occluded, and in the larger vessels with an external coat there is an increase in thickness. Sometimes giant cells are found. The epidermis suffers secondarily and presents a varied picture, such as atrophy, hypertrophy, erosion, or ulceration. From the newly-formed granulation tissue connective tissue is formed which later scleroses and leads to fibrosis. With the interference of the nutrition retrogressive metamorphosis takes place." (Fordyce.) Spirochetes can always be demonstrated in the chancre by appropriate staining methods; of these the new method by Levaditi seems to give the best results. Spirochetes usually appear in enormous numbers between and within the cells. The reader is referred to the excellent

illustrations in Hoffmann's *Atlas der aetiologischen und experimentellen Syphilisforschung.*

The microscopic picture of secondary syphilitic lesions reproduces that of chancre. The characteristic features are newly-formed and dilated bloodvessels exhibiting changes such as described above and perivascular infiltrations of lymphocytes and plasma cells. Giant cells are usually more abundant. A mucous patch on the cervix examined by us showed thickened and hornified squamous epithelium overlying tissues which presented the alterations just described. In a papule of the cervix we found, in addition, a marked proliferation of the surface epithelium with very high papillæ. Our Case VI gave us the opportunity to study the histology of secondary ulcers of the cervix. The sections showed squamous epithelium only in one place. The epithelium was thickened and swollen. The rest of the section was made up of granulation tissue with numerous bloodvessels; giant cells were absent. Scattered throughout the infiltration a large number of polynuclear leukocytes could be seen. These must be attributed to the action of adventitious bacteria which had gained access after the protecting layer of epithelium had been destroyed. This point was definitely proved by the study of sections stained according to Levaditi. After considerable search we found in these sections two typical spirochetes which are shown in Fig. 12. *In another field and nearer the ulcerated surface there were several colonies of diplococci which morphologically were identical with gonococci.*

Tertiary lesions differ from secondary ones only in the extent of granulomatous infiltration. This is satisfactorily explained by altered tissue reaction, the "Gewebsumstimmung" of Neisser. Weakened by the long-lasting and all-pervading influence of the syphilitic virus the tissues offer a lessened resistance to the parasites, although the latter have greatly diminished in number. The last-named fact

explains why spirochetes are only occasionally found in the peripheral portions of gummata.

The early stage of gumma is beautifully illustrated in our Case XIII (Fig. 13 to Fig. 15). A hard node in the cervix of a fibromatous uterus removed from a syphilitic woman created suspicion and microscopic sections of the cervix were made. The node in question was found to be caused by granulomatous infiltration at some distance from the surface. This infiltration was diffuse in some places and arranged about the bloodvessels; in others it was sharply circumscribed, the surrounding tissue forming a kind of limiting capsule. Within these foci there were oval cells with abundant protoplasm resembling epitheloid cells. In or near several of these foci giant cells were found. These varied in size: in one of the larger ones 36 nuclei could be counted. The lymphocytic infiltration split the muscle or connective-tissue bundles into individual fibers. In the perivascular infiltration plasma cells were abundant. Bloodvessels were numerous both within and without the circumscribed foci and showed varying degrees of endothelial thickening. In one of them (Fig. 15) an organized thrombus could be seen.

From such small beginnings the infiltration spreads throughout the affected tissues until a mature gumma covers the entire field with its granulation tissue. We have studied this stage in Case VI, and we shall submit our findings in detail in another paper to be published in *Surgery, Gynecology and Obstetrics* at a later date.

Morisani gives a detailed description of the findings in an interesting case of tertiary lues of the uterus. The endometrium was slightly thickened and was eroded in a number of places. The glands were slightly dilated; the epithelium was well preserved. The subepithelial connective tissue was hyperplastic with numerous hemorrhagic foci. In the myometrium an abnormal proliferation of the connec-

tive-tissue elements had taken place in such a way that the bundles of muscle fibers had become separated from each other. There were also numerous extravasations of blood between the muscle fibers. The lymphatic spaces were dilated. Most conspicuous was a proliferation of blood-vessels with thickened walls. This thickening was chiefly present in the intima, where also an infiltration with small round cells was discernible. The elastic tissue was markedly hypertrophied in this layer. The tunica media showed hyaline changes. The adventitia was hyperplastic and densely infiltrated with small round cells.

This peculiar alteration of the adventitia was observed in one of our own cases, where broad fibrous bands encircled the vessels and formed anastomoses with other bands in the vicinity. *However interesting and important such vascular changes are in syphilis, yet they are not pathognostic, and in a given case a final diagnosis can not be made from the histologic picture alone without the history and the corresponding clinical findings of the case unless one succeeds in demonstrating the Spirocheta pallida in the tissue.*

Chapter IV

SYPHILIS OF THE VAGINA

A. Primary Lesion. The literature on primary chancre of the vagina contains but few authenticated observations. Fournier, whose pioneer work on syphilis of the female genitals has been given due appreciation in the foregoing pages, remarked that he had never made a positive diagnosis of primary sclerosis in the vagina, and only in one case did the findings justify a tentative diagnosis of such a condition. Mauriac (1883), in his text-book on venereal diseases, quoted two observations by Martineau. In 1881 Glueck reported

2 cases and Bockhart (1885) contributed 1 instance (No. 11). Neumann (1896) characterized the affection as extremely rare and added that in his large material he had seen only 4 instances. More fortunate in his systematic search for syphilitic manifestations in the vagina was Rille, who, in 1904, recorded 21 personal observations of primary chancre. To this list must be added 4 cases discovered by Bobrie (1914) among 1182 women with primary chancre in various localities. Nielsen, finally, in 1915, published 1 case (No. 82) and referred to another reported by Barbiani in 1900.

The rarity of the condition which is emphasized by practically all writers on the subject may, according to Rille, be but an apparent one. This author is inclined to ascribe it to neglect in searching for the lesion in the vagina and, furthermore, to the rapidity with which these chancres heal and disappear completely, so as to leave no trace when secondary symptoms attract the attention of the examining physician.

Granted the truth of these arguments, there is still the natural resistance of the vagina to be considered. Protected as it is by a thick layer of squamous epithelium which contains neither follicles nor glands, and endowed with elastic and pliable walls, the vaginal tube, under ordinary circumstances, is not apt to present breaks in the surface continuity, however minute, which the Spirocheta pallida requires as a port of entrance. The character of the vaginal secretions which possibly dilute or neutralize the virus may be an added protection, as suggested by Rille, and Barbiani specifies the acid reaction of the vaginal secretion as the potent and protecting factor, since in his case the vaginal secretion exhibited alkaline reaction.

It is plausible to assume, with Neumann, that a coexisting gonorrhea would break down the defensive barrier by destruction of the surface epithelium and thus blaze the way for a luetic infection in this unusual location. In the case of

Bockhart, in which the chancre occupied the upper third of the posterior vaginal wall, the situation of the ulcer could well be explained by the habitual use of a contrivance designed for the benefit of sexual perversion—a rubber ring with several rows of tooth-like projections which is slipped over the penis and intended to stimulate the jaded passion of woman.

Not having found a single chancre in the vagina in several hundred syphilitic women examined by us, we shall follow, in the main, Rille's description of the macroscopic appearance of the lesion. This author also furnished two illustrations of chancres on the vaginal wall in cases of prolapse. The vaginal sclerosis differs in nowise from that found on other mucous membranes; it represents a sharply outlined, slightly concave ulcer with a disk-like induration beneath its base, whose consistency is generally likened to that of parchment. As a rule it is small, especially when situated deep between the folds of the vaginal wall, but it may occasionally attain a diameter of 2 cm. It either presents a reddish-brown, glistening surface which secretes a scanty amount of serous fluid, or it is covered with a thin yellowish or whitish film, a pseudomembrane which adheres firmly to the base. The first represents the eroded and the second the ulcerated form of sclerosis, the latter, according to Oppenheim, being the more frequent. In either case, spirochetes are present in large numbers. The posterior vaginal wall is more frequently affected than the anterior. Neumann describes, in his cases, the induration and elevated edges around the sharply outlined ulcers, but the contours are not always equally well defined.

Typical changes in the inguinal glands occur only in those cases where the lesions are located in the lower third of the vagina. It goes without saying that the regional glands of the upper two-thirds are located in the depth of the pelvis and inaccessible to palpation.

Gardillon (1881) emphasizes the rapidity of spontaneous cure, which is explained by Rille as being due to the smallness of the sores and the absence of any massive induration. There are, however, exceptions to this rule. In Bockhart's case the sclerosis showed no tendency toward resolution after more than two weeks, undoubtedly owing to the continued irritation by the rubber contrivance described above. In Barbiani's case the vaginal chancre was discovered one week after secondaries had appeared, and therefore was of about seven weeks' standing. Nielsen's case of an exceptionally large ulcer showed only a beginning cicatrization, although the infection dated four months back, a point which Nielsen explained by the fact that his patient was pregnant. Pregnancy is, possibly, a factor which prevents rapid resolution, for in the case reported by Chaleix-Vivie (1901) we also read of a primary chancre in the lower third of the posterior vaginal wall in a pregnant woman who had acquired syphilis six months previously.

As has been mentioned, chancres eventually disappear completely; only very occasionally may very thin, superficial, whitish scars or spots denote the seat of previous primary lesions.

SUMMARY

Primary chancres of the vagina are rare, probably because of certain histologic and biologic characteristics of the vagina. The typical sign of sclerosis of a mucous membrane, *i. e.*, parchment-like induration, persists, as a rule, only for a short time. Under ordinary circumstances, spontaneous restitution occurs after about two weeks. The absence of definite symptoms such as pain or vaginal discharge, and the insignificance of any remaining scars probably result, in a number of instances, in failure or even inability to correctly diagnose this lesion.

B. Secondary Lesions. Fournier's and Neumann's treatises on syphilis, a monograph by Oppenheim, and the papers of Balzer (1890) and Rille (1904) apparently represent the only sources of information regarding secondary manifestations in the vagina.

These lesions are probably very rare. Fournier noticed that even with the coexistence of the most severe luetic affections of the vulva or perineum the vaginal mucosa, as a rule, was found normal, "as if the vulvar ring was acting as a secure barrier." In a certain number of cases the lesion may escape attention, as it causes absolutely no symptoms; in other instances it may be overlooked because in the presence of vulvar syphilis, speculum examinations are usually not made and frequently are objected to by the patient because of the extreme tenderness of the external parts. Admitting the possibility of these exceptions the fact yet remains that in 522 patients with secondary syphilids about the external genitals, Fournier found only 9 cases of secondary lesions in the vagina, including those which were located at the vulvovaginal ring, and thus did not belong to the vagina proper. In none of his cases were there any lesions in the middle portion of the vagina, and where they were seen in the upper portion they merely appeared as satellites of similar affections upon the cervix.

Balzer, quoting Fournier, Martineau, Prieur, and Fouquier, refers to secondaries in the vagina as "beyond doubt" and "well known." Rille raises the question whether writers who proclaim such changes as being common are not deceived by conditions of similar appearance, such as gonorrheal maculæ, genital herpes, and colpitis aphthosa.

Secondary syphilis of the vagina appears either as a macule or a papule; the latter may become eroded and ulcerated or else hypertrophic.

Morgan, Zeissl, Finger, Courty, and Heitzmann claim to have seen vaginal macules as a partial symptom of a

generalized roseola. The macules which, like the corresponding skin eruptions, are essentially due to capillary dilatation, may, according to these authors, be either isolated or diffused; in the latter event the entire vagina is reddened ("*erythema vaginæ syphiliticum*").

The papular syphilid has been studied more accurately; it appears in the form of a moist papule, usually in the upper part of the vagina, and, as a rule, multiple. Fournier depicts 2 cases, 1 with seven, the other with ten papules. A similar picture is given by Oppenheim.

Vaginal papules display the usual form; they are small, well circumscribed, round, or oval elevations with a flattened top, and are either isolated or blend so as to form polycyclic placques. Discrepancies in the various descriptions given are no doubt due to rapid changes throughout the course of their existence. The simple form is of a light pink color which differs but slightly from that of the surrounding mucosa. The surface soon becomes eroded, moist, and darker red in color. The ulcerated papule is covered by a diphtheric exudate which can be wiped off easily, and closely resembles aphthous ulcers or infected vesicles of herpes genitalis. This pseudomembrane, according to Fournier, is of a whitish, opaque, or yellowish tint and surrounded by a thin reddish ring of demarcation. Orth states that the rare lesions of the middle portion of the vagina may represent fissures or excoriated narrow plaques.

Neumann describes a peculiar vaginitis (*colpitis granulosa syphilitica*) which in its general appearance is identical with the common colpitis granulosa, and can be recognized as specific only if the minute granules become eroded and transformed into typical moist papules, or if they disappear promptly upon antiluetic treatment.

The hypertrophic form of the papule, *i. e.*, the condyloma latum, is excessively rare in the vagina (Oppenheim).

SUMMARY

Secondary syphilitic lesions of the vagina are very rare. They occur either in the form of macules or of papules; the latter variety seems to be relatively more frequent. They have no symptomatology of their own and therefore are discovered only accidentally during an examination with the speculum.

C. Tertiary Lesions. Lancereaux (1868), referring rather vaguely to Benevenius (apparently a case of vesicovaginal fistula) and Astruc, remarks that literature does not contain any positive records of tertiary manifestations of syphilis of the vagina "which surely must be even rarer than the very exceptional primary and secondary lesions."

In 1877 Birch-Hirschfeld described a case of diffuse gummatous perivaginitis (No. 9). Winckel reports as endocolpitis diffusa gummosa a case in which the luetic process is assumed to involve solely the vaginal mucosa (No. 144). A vaginal ulcer diagnosed as a tertiary luetic lesion is placed on record by Verchère (No. 120). Neumann up to 1896 had seen only 3 cases of vaginal gummata; 2 of these were associated with gummata of the cervix. Shortly afterward (1898) Viannay made the startling statement that tertiary syphilitic ulcers are not as rare as commonly supposed; they are simply overlooked because they cause little if any discomfort or are incorrectly diagnosed as soft chancres, and he supported his claim by citing six personal observations.

In the case of Spinelli (No. 111) a nodule palpated in the posterior cul-de-sac was interpreted as gumma of the vaginal wall. Herxheimer (1907), in his review of the literature, refers practically only to Neumann, and fails to mention (or to consider) later reports, for instance, that of Viannay.

Oppenheim (1908) gives a good colored plate of a luetic ulceration observed by him. Kurz (1913), in an article on esthiomène, attempts to prove that this disease represents but a tertiary luetic lesion. Under this theory one of her cases (No. 50) must be cited here as gumma of the vagina. The most recent record of a tertiary ulcer in the vagina is that of Bollag in 1914 (No. 13).

The assertion of Viannay to the contrary notwithstanding, tertiary manifestations of syphilis in the vagina are rare. The bibliographic references given above probably do not embrace all cases actually observed or reported; but, on the other hand, they include several instances which can not withstand critical scrutiny.

Winckel's case of colpitic gummosa is quoted and accepted by all subsequent writers as a definite type of luetic lesion. The description of this disease is based on a single observation, that of a woman who neither gave a history nor presented any evidence of syphilitic infection, and who derived no benefit from specific treatment. The only suspicious symptom she ever had was that at one time her hair had fallen out rapidly but had grown again. Winckel epitomizes: "Since the condition is neither a simple croup nor diphtheria, it is best named colpitis gummosa." No other report of gummatous colpitis can be found in literature. Only Neumann states parenthetically that the gummatous perivaginitis of Birch-Hirschfeld is seen more often than the gummous colpitis of Winckel. Oppenheim declares that he has seen neither form.

The case of Barthélemy (No. 5) seems to be a gumma which had originated in the rectum, though a simple inflammatory infiltration of the rectovaginal septum can not be excluded with certainty.

It is surprising that Bollag insists on the diagnosis of tertiary ulcer in the face of the fact that the patient gave no history of syphilis and had a negative Wassermann without ever having received specific treatment. The fact that

the ulcer was found healed ten weeks after the administration of neosalvarsan hardly seems to prove its specific nature. The case of Spinelli equally lays itself open to criticism.

The observation of Kurz, referred to above, can be accepted as a tertiary lesion only if the correctness of the author's premise, namely, that esthiomène is of luetic origin, is accepted, and this is still a mooted question. Aside from the fact that in this case the vaginal lesion was but a direct continuation of the vulvar affection, it must be noted that the diagnosis of syphilis was based solely on the statement of the patient that she "caught a sore from her husband" during her last pregnancy nine years previously, and on the history of an abscess in the right groin, six weeks after the birth of this child, which was slow to heal.

The ulcerations described by Verchère are not very typical and in certain particulars strongly suggest soft chancres. While this possibility is admitted by the author, yet he feels that he could safely exclude soft chancre from the result of a test which we today no longer regard as trustworthy. He inoculated secretion of the vaginal ulcers into the skin of the abdomen and failed to produce similar lesions. It must, however, be admitted that these small ulcers disappeared within a few days after the administration of mixed treatment.

There is, then, only a very limited number of unquestionable observations from which a picture of the pathology of tertiary lesions can be drawn.

As to location, they are usually but a continuation of like lesions in the vulva or adjoining organs; in one of Viannay's cases the point of origin seemed to be the uterus.

Morphologically, Neumann differentiates between two types: in one there are individual and well-separated nodules; in the other the affection is diffuse but the vaginal wall is never involved throughout its length. Within the affected area the vaginal wall is thickened and rigid; the surface is

smooth because of the flattening out of the vaginal folds; the mucosa itself is dark red and covered with a film of viscid or fibrous exudate. Oppenheim considers the isolated nodular type extremely rare, although gummata may occasionally be found in the fornix. At the time they are discovered they have broken down, as a rule, and give the appearance of ulcers. These are sharply outlined, deeply excavated, and surrounded by steep, high, undermined edges, as if "punched out." The base is covered with a dirty gray exudate and is not encircled by a reactive zone. Oppenheim's atlas contains a good picture of a typical gummous ulcer, about the size of a silver quarter, situated in the lower portion of the posterior vaginal wall.

Rille believes that small tertiary ulcers are not characteristic enough to be diagnosed except *per exclusionem et ex juvantibus*. Large ulcers are less common and may, as the result of long-standing induration, lead to elephantiasis of the external genitals.

The description given by Viannay tallies with that of Oppenheim: more or less deeply excavated, indolent ulcers, surrounded by sharp edges, and found quite commonly in old prostitutes; they disappear promptly after the use of potassium iodide. "The inexperienced will diagnose them as soft chancres."

The question of pain is discussed in some detail only by Fournier. His own description, however, seems to prove that it is by no means characteristic. He speaks in his case of dull pain which is aggravated by exertion, and then adds "Absence of a painful induration may so completely conceal a vaginal gumma that the physician eventually is surprised by the sudden development of a vesicovaginal fistula."

As to the final course, the nodular gumma may disappear without leaving a scar. The ulcerated type leads to the formation of very hard cicatricial tissue which, however, does not result in stricture of the vagina (Oppenheim). Vesicovaginal or rectovaginal fistulæ result more often

from the breaking down of gummata which originated in the bladder or rectum. The diffuse form of tertiary lesion may lead to very extensive ulcerations which, in their turn, may result in large tissue defects, massive scars, or marked constriction or distortion.

SUMMARY

Tertiary luetic manifestations originate but very rarely in the vagina. When found there, they represent, as a rule, the continuation of a like condition which had started from the vulva, the uterus, or adjoining organs. The isolated submucous gumma breaks down early and appears in the form of a more or less characteristic ulcer. The more destructive processes which eventually lead to the formation of fistulæ and strictures, almost always originate in structures surrounding the vagina. Tertiary lesions of the vagina do not exhibit characteristic symptoms such as pain or discharge.

The infrequency of tertiary lesions corresponds with the rarity of secondary manifestations in the vagina and tends to confirm the statement of Pusey that tertiary lesions occur only in tissues in which foci of infection have been planted during the secondary period.

Chapter V

SYPHILIS OF THE CERVIX.

A. Primary Lesion. Gosselin, in 1843, seems to have been the first to call attention to the fact that ulcerations on the cervix may develop as the result of a syphilitic infection, but he did not attempt a differentiation between the

various ulcerative processes. In the following year Bennet describes the typical Hunterian chancre on the vaginal portion. Approximately at the same time, beginning with Behrend (1842), a series of studies appear dealing with the etiology and symptomatology of cervical erosions and ulcerations. In these articles the word chancre occurs frequently, but obviously not with its present meaning. Bernutz (1855) divides cervical "chancres" into three groups: (*a*) typical, not inoculable Hunterian chancres; (*b*) diphtheric, and (*c*) ulcerous, phagedenic chancres. Sigmund (1855) employs a like classification; but as at that time syphilis and gonorrhea were still held to be identical, neither author differentiates between the syphilitic and non-syphilitic, between the hard and soft chancres, though occasionally an attempt can be noticed to distinguish the inoculable from the non-inoculable type. Somewhat later Sigmund (1863) advises to look for general manifestations for the purpose of distinguishing the "venereal" ulcer from the syphilitic. Guérin (1864) endeavored to give the soft chancre its distinct and separate place from the hard chancre, but according to Mrazek, from whom this reference is quoted, his teachings, like those of Rollet (1866), Després (1870), Courty (1872), Galliard (1875) and of others, are not entirely free from objections.

The recognition of the hard cervical chancre as a definite pathologic lesion is the result of the valuable observations of Fournier embodied in his *Leçons* (1873). Two of Fournier's cases are discussed thoroughly in a thesis (1873) by his pupil Schwartz, while almost at the same time, in another thesis, Fourcault presents the material of A. Martin. There follows an article by Klink (1878) and a frequently quoted paper by the Russian physician Rasumow (1880). At about the same time Heitzman, of Vienna, published the first illustrations in color of cervical chancres (later embodied in Oppenheim's atlas). Mrazek, in 1881, contributes the

most extensive study of the problem up to that time; his article is based on 21 personal observations.

The transactions of the Anatomic Society of Bordeaux (1886) contain references to observations of primary sclerosis of the cervix made by Chambrelent, Hirigoyen, Verzeley, and Moussous. For the American reader the subject is discussed in a general way by Renaul in an essay published in the *International Clinics* of 1894. The treatise on *Syphilis* by Neumann (1896) deals exhaustively with the primary cervical chancre of the vaginal portion. Very little of importance has since been added to our knowledge and most of the later writers have liberally quoted or copied from Neumann. In 1902 a few single observations are recorded by Blandin (No. 10), Brindeau (No. 18), and Rostaine and Druelle (No. 102), followed in 1904 by an interesting discussion by Thibierge of the manifold consequences to which the location of a primary sclerosis at the external os may lead. In the same year Rille startled the medical world with an analysis of 160 hard chancres of the cervix which he claims to have seen within the short space of five years. From then on only isolated case reports appear in literature. The year 1905 marks Schaudinn's memorable discovery of the Spirocheta pallida in primary lesions, and the greater accuracy now demanded may have exerted a restraining influence upon the publication of suspicious cases. An interesting fact in this connection is that, according to Bab, the first confirmation of Schaudinn's discovery came from Paschen, who found typical pallida on a cervical chancre. We quote in the appended collection of case reports the more recent observations of Moraller (1908), Ivens (1908), Falk (1908), Ozenne and Duroeux (1912), Skutul (1912), Neisser (1913), Zomakion (1913), Gaucher and Giroux (1913), Shillitoe (1914), and finally of Wile and Senear (1915). This collection is probably not complete, in spite of our efforts to make it so, but a perusal of these abbreviated his-

tories will convince the reader that recent literature, while numerically scanty, is richer in good records of well-authenticated observations.

While all observers agree that the cervical chancre is the most common of all luetic lesions of the internal genitals, they do not agree on the exact percentage of frequency.

Sigmund (1863) figured it as 7.5 per cent.; Klink (1878) in 332 patients as 2.4 per cent.; Rasnumow (1880) in 1347 patients as 0.94 per cent.; Mrazek (1881) in 437 cases as 4.7 per cent.; Fournier (1881) in 249 patients as 5.2 per cent. (adding that the figure would have been almost doubled had he not been careful to exclude all doubtful cases); Renaul (1894) simply states: "I saw several cases of primary chancres at the os uteri during the past year." Neumann (1896) calculates the frequency in 800 patients as 6.4 per cent.; Rille (1904) naturally concludes from his 160 cases seen in five years that the affection is comparatively common. Oppenheim (1908) estimates the frequency at from 8 to 10 per cent.; Skutul (1911), compiling various extensive statistics, figures it as 1.5 per cent.; Zomakion (1913) found cervical chancres only in 2 instances out of a total of 8500 patients and considered the condition very rare; Wile and Senear figure the frequency from two observations in 50 patients as 4 per cent. Bandler quotes Joseph (no bibliographic reference given), who estimates that in 15 per cent. of syphilitic women the primary lesion is located on the cervix.

From these various statistics but one fact seems quite apparent. Rasumow, Skutul, and Zomakion, who make their calculations from a large number of patients, figure a frequency of less than 1.5 per cent. in striking contrast to the mere estimates which vary between 10 and 15 per cent.

That the discoveries of the Spirocheta pallida and of the Wassermann reaction were bound to lower the percentage

figures given by older writers can be seen from an investigation of the manner in which, *e. g.*, Engelstedt established the diagnosis of a syphilitic chancre. Mrazek quotes Engelstedt who examined 100 syphilitic women. In 44 of them he was unable to ascertain the location of the primary sore from the history given by the patient. In 39 of these 44 women he discovered granulations and excoriations on the vaginal portion and therefore felt justified in concluding that their presence proved that these lesions represented the ports of entrance for the infection. In these 100 women he thus calculates the frequency of cervical chancres as 30 per cent. Mrazek accepts Engelstedt's deductions as plausible, a view which we can no longer share with him.

In referring to the location of hard chancres Fournier states that they lie either centrally, surrounding more or less completely the external orifice, or eccentrically on one lip, usually the posterior, and in this event distinctly separated from the os by normal mucosa. When situated near the orifice they are apt to extend into the cervical canal, as he was able to determine definitely in one case in which a cervical laceration permitted the easy dilatation of the canal. In general this description is the one usually quoted by writers, with possibly one important difference. Mrazek, in 12 observations of eccentric location, found the chancre 8 times on the anterior and only 4 times on the posterior lip, and adds that this favored position is easily explained by the fact that in the normal position of the uterus it is the anterior lip which comes into contact with the penis. McCann and Oppenheim also consider the anterior lip more commonly affected.

The central location is the more common of the two; thus, Schwartz found 14 out of 19 cervical chancres at the os. Various explanations have been offered. According to Oppenheim the primary lesion often develops in a pre-existing erosion, which point is well illustrated in some of

his pictures. Mrazek thinks that excoriations and superficial abrasions without which an infection can not occur are more often present at the external os. Parous women predominate among those who exhibit cervical chancres, probably because cervical lacerations, often resulting in erosions, offer particularly favorable conditions for the entrance of the virus. Fournier mentions the softening of the cervix during menstruation, and especially during pregnancy, as an additional predisposing factor. It seems more than a coincidence that of the appended 18 case reports of typical primary lesions on the cervix, in 5 the patients were pregnant at the time of infection.

The chancre may either extend from the vaginal portion into the cervical canal or it may be planted primarily within the latter. Ricord and Fournier have expressed similar views, and Mrazek refers in this question to Foerster, Kiwisch, and particularly Courty, who has recorded 6 personal observations. The presence of a chancre hidden within the cervical canal is suggested by a persistent hemorrhagic discharge from the cervix, and may finally be confirmed by the destruction of the external orifice through necrosis.

While in men the initial lesion is usually single, in women multiplicity is not uncommon. Fournier, in 13 cases of cervical chancre, found 2 in which both lips were affected simultaneously. Mrazek saw three multiple cervical chancres in 24 cases, and Oppenheim shows in one of his pictures a cervical chancre associated with three typical primary lesions on the vaginal wall. This author states that in some cases of cervical chancres another primary chancre may be discovered on the external genitalia, but that rarely more than one sclerosis is found on the cervix itself. In this connection Mrazek points to the interesting fact that in case of multiplicity of primary lesions, though all had started practically at the same time, they may later show a very marked difference in their appearance due to the various

external influences affecting them in their respective locations. Neumann speaks of a chain-like arrangement of these rarer multiple lesions, and Rille expresses the opinion that the circular sclerosis surrounding completely the external os is but the result of confluence of several lesions.

The shape of the chancre seems to depend on its location. The eccentrical lesion is round or slightly oval, or polycyclic (Oppenheim), as the result of confluence of several chancres. The centrally located chancre presents the shape of an incomplete, more rarely that of a complete circle.

Its size usually is given as between the size of an almond and kidney bean, occasionally much smaller. Franceschini's reference to a lesion which spread diffusely over the entire cervix must be considered a very exceptional observation.

The diagnosis of hard chancre on the cervix rests largely upon its aspect in the vaginal speculum, but the descriptions given by different writers vary in certain essential features.

According to the classical description by Fournier the cervical sclerosis is found either as a flat or a papulous lesion. Starting as a flat erosion it usually ends as a papule, slightly elevated, with the typical flattened top. It exhibits a smooth surface covered with a characteristic grayish pseudomembrane which shows a peculiar fatty luster (*gris lardacé* of the French; *speckig glaenzend* of the Germans) that is distinctly different from the color of the surrounding mucosa. At times the gray changes into a lighter white, even a dead white. In other instances the gray has a distinct yellowish tint and small hemorrhagic spots appear in the field. The pseudomembrane represents a film of exudate which covers the ulcer and adheres rather firmly to its base.

To Rille the cervical chancre appears as a shallow defect with brown glistening surface, which may be partially covered by a grayish-white or grayish-yellow and tightly adherent membrane.

Mrazek found in most of his observations an ulcer covered

with a diphtheric-looking membrane. When the latter is removed a glistening surface becomes visible which is studded with small hemorrhagic points and exhibits a scanty secretion. In some cases there was, at first, a sclerotic nodule which soon underwent local necrosis and changed into a slightly depressed ulcer whose base was covered with bleeding and, in some instances, exuberant granulations.

A rather detailed description is given by Oppenheim, who divides the initial cervical lesion into four groups: (*a*) The *simple eroded lesion* probably represents but an infected preëxisting erosion. It is a flat or slightly raised plaque, sharply defined, often perfectly round, with a smooth and glistening surface, which on touch does not bleed easily. The surface is either perfectly clean, or partially covered with a grayish-white fibrinous or grayish-yellow putrid deposit. The surrounding mucosa is practically normal. (*b*) The *diphtheric chancre* shows a similar outline. The covering film is whitish yellow and firmly adherent. The surrounding mucosa is reddened through inflammatory changes. The edges are never undermined and are level with the surrounding mucosa. (*c*) The *ulcerated sclerosis* also has flat edges, but the base of the ulcer is somewhat depressed. The pseudomembranous covering is yellowish-white and easily wiped off. The inflammatory reaction in the surrounding mucosa is pronounced. (*d*) In the *gangrenous type* the edges are rather irregular, the base uneven, deeply excavated, and covered with a dirty-looking grayish-yellow deposit.

According to Chase these initial lesions resemble much more closely the secondary syphilids of the tongue and soft palate than the chancres of the penis.

A phagedenic chancrous ulcer seen on the cervix of pregnant women is mentioned by Winckel.

Wile and Senear (No. 142) found the sclerosis in one of their cases in the form of a "hypertrophic, fungating vege-

tation." This description corresponds to that given by Mollière (No. 74).

Thibierge (No. 118) and Ivens (No. 42) consider bleeding on slight touch as one of the characteristics.

Neumann speaks of a non-ulcerated sclerosis which appears simply in the form of a diffuse, dark red induration.

The edges of the ulcers have been variously described as flat or slightly raised (Rille, Franceschini) and "sloping down gradually" (Fournier). There seems to be a difference of opinion concerning a red ring of inflamed mucosa surrounding the chancre. Fournier describes it "as a narrow line bringing out more clearly the contrast with the grayish centre." According to Mrazek it is a large red, swollen ring, according to Rille a sharp, brown, glistening line. Wile and Senear emphasize that the purpuric or hemorrhagic border so characteristic of chancres is usually demonstrable. Franceschini speaks of a slightly elevated edge without any peripheral inflammatory reaction.

All writers agree that the lesion is entirely indolent and that it possesses only very scant secretion.

Consequently hard chancres of the cervix do not cause any symptoms suggestive of their presence unless the chancre is situated within the cervical canal when it produces hemorrhagic discharge as already mentioned.

There are, then, noticeable divergences in the description given by various writers, differences that can only be explained on the ground that these lesions may present different aspects in different stages of their development. Moreover a chancre is primarily a granuloma; the cells of a granuloma, incapable as they are of organization, are bound to undergo fatty degeneration and offer no resistance to the invasion of any of the bacteria in the vagina. It is this accidental bacterial infection which still further modifies the aspect of the chancre. We may sum up the question of outer appearance by saying in a very general way that

the primary lesion represents a more or less deep funnel-shaped sore with thickened, rounded edges which slope down to a smooth, dry floor of a glistening, varnished appearance—the typical Hunterian chancre.

The one essential characteristic of any initial luetic lesion, the feature well expressed in the commonly used terms sclerosis or hard chancre, viz., the distinct and well-circumscribed induration of its base, unfortunately can often not be clearly ascertained in cervical primary chancres. Again it was Fournier who first pointed out the two chief difficulties: the natural hardness of the cervix and its inaccessibility, the impossibility to grasp the base of the ulcer between two fingers. Only in those exceptional instances where the chancre is found on the cervix of a prolapsed uterus can a satisfactory examination be made. The consistency of the cervix not only varies markedly in different individuals, but, indeed, in the same woman under the influence of menstruation, or as the result of lacerations, chronic inflammatory processes, or newgrowths. Further, the entire cervix becomes larger and harder when it carries a chancre anywhere on its surface. Neumann describes the vaginal portion in cases of cervical chancres as enlarged *in toto*, heavy, "so that on introduction of the vaginal speculum it fairly jumps into view," a vivid picture which has frequently been quoted by other writers.

In cases in which the cervix is soft, for instance, in pregnant women, the induration is definite and the difference in consistency with the rest of the portio marked. Mrazek emphasizes that while at first, during the state of acute edematous swelling of the entire cervix, it seems impossible to differentiate the induration of the lesion, it often becomes an easy matter later, when the edema has disappeared, to discern the sharply marked infiltration of the base which in the speculum appears surrounded by a livid marginal line. According to the location of the lesion either only one lip

or the entire cervix appears hardened and broadened. Mrazek also ascertained by microscopic examination that the infiltration extends beyond the periphery of the ulcer and progresses downward to the muscularis.

There are four cases on record of primary chancres on the cervix of a prolapsed uterus. In the first, described by Ricord, the induration was pronounced, cartilaginous, almost wooden. The second case, always ascribed to Rollet, but actually observed by Viennois, presented the sclerosis in the form of a large superficial erosion with the characteristic parchment-like induration of its base. A very good description will be found in the case of Ozenne and Duroeux (No. 91). A fourth observation of this kind is simply mentioned by Rille, though he fails to give a detailed description of the findings.

The indolent swelling of a definite group of lymph glands (satellite bubo) would represent, theoretically at least, a most important if not pathognostic sign of the initial lesion. In cases of a cervical chancre it is the iliac and hypogastric groups of lymph glands that presumably are involved but, as Rille asserts, they never become palpable and never have been found characteristically changed in postmortem examinations. Oppenheim refers to the enlargement, occasionally observed at a late stage, of the inguinal glands and explains this phenomenon as due to an anastomosis of the lymph ducts of cervix and uterus with those of the round ligaments.

The healing process, well described by Fournier, proceeds with striking rapidity. Changes in the appearance of the sclerosis are so marked from day to day that it is hard to recognize the ulceration. Indeed it may be seen one day and may have disappeared the next. The sore soon looks like a simple, innocent erosion which may quickly turn into a slightly reddened area and may disappear soon, usually without leaving any noticeable trace. In one case only did

Fournier find a whitish depression, the remnant of the complete cicatrization of the primary lesion.

Observations of other writers do not entirely confirm those of Fournier. Mrazek finds that final cicatrization may be delayed by pregnancy or by the more common complication with a gonorrheal infection. The final result is a chronic, refractory, granulating ulcer. Similar views are expressed by Rille. The primary lesion will heal, as a rule, within two or three weeks but occasionally persists longer. The scar finally formed may even break open again, representing a recurrence *in situ*. Neumann, too, met with such chronic erosions, extremely refractory to treatment, at the site where the primary sclerosis originally had been located. Delay in the healing process as the effect of an intercurrent pregnancy has been mentioned by other authors, and is quite apparent, for instance, in the case of Moraller (No. 76) in which the ulcer was not healed, although the secondary exanthema had already put in appearance several days previously.

Three factors, writes Thibierge, are chiefly responsible for the rapid and complete healing of the cervical chancre: (*a*) its location which ensures for it freedom from friction and irritation, to which chancres in other locations are exposed and by which their longer duration is maintained; (*b*) the relatively higher and even temperature in the upper portion of the vagina; and (*c*) the equable state of moisture by which the surface of the chancre is being constantly macerated.

It has been claimed that the sclerosis disappears without leaving a scar, but Oppenheim, who so carefully differentiates between the various types of primary lesions, finds definite differences in the resulting tissue alterations. The superficial erosion leaves a very thin, superficial scar. The other types leave scars which are proportionate to the destruction of tissue, so that the scar may be distinct, and, in the gangrenous sclerosis, even cause constriction of the external os.

This leads us to the discussion of a question which is not entirely within the scope of this paper and therefore can only be considered very briefly.

In obstetric literature, dystocia is frequently mentioned as being due to luetic alterations of the cervix. This question was probably first introduced by Doléris. Among the later contributors to the problem we may mention Woyer, Brassart, Blandin (No. 10), Brindeau (No. 18), and Chaleix-Vivie. It may suffice to state here that in the various observations three distinctly different conditions of the cervix are assumed to be the cause of an unusual rigidity during the first stage of labor: (*a*) the presence of a primary chancre at the os which under the influence of pregnancy causes an exceptional degree of diffuse induration throughout the entire cervix; (*b*) a dense, unyielding scar at the external os or even within the cervical canal (Rille), remaining after healing of a primary lesion, or (*c*) tertiary lesions, as such to be considered later.

As to the first proposition, it must be acknowledged that active primary lesions during labor very rarely have been observed. Blanc records such a case in which cervical incisions were required. A case reported by Fasola is interpreted in this manner by Oui (No. 84). In one of Mrazek's cases a primary chancre presumably caused difficulty in the first stage of labor.

There is better evidence at hand concerning the stenotic effect of scars after the primary chancre has healed. If the necrotic process, destroying the primary induration, is extensive a larger mass of scar tissue must needs be formed. Thus the scar, to a certain extent, will be the expression of the amount of induration which is exceptionally extensive in pregnancy. Thibierge thus speaks of a dangerous amount of induration during pregnancy. Mrazek (quoting Kiwisch and Foerster as his authorities) and Woyer fear the resulting scar constriction and advise very vigorous treatment of

cervical chancres observed during pregnancy by means of repeated removal of all granulations and the occasional careful dilatation of the os. On the other hand, it is pointed out by Oui and Chaleix-Vivie that not every cervical rigidity in a syphilitic woman can be explained in this manner.

Shaw-Mackenzie makes rather vague claims that in the syphilitic woman cervix, perineum, and even uterus show during labor a distinct predisposition to lacerations. This claim has been emphatically repudiated by Winckel.

The question of cervical stenosis has also appeared in gynecologic literature.

Rille could find only one stricture in his 160 cases, but according to Oppenheim an obstructive dysmenorrhea is not uncommonly a sequel to cervical chancre. Neumann is convinced that in exceptional cases the scar retraction may cause deformities of cervix and malpositions (Foerster) and may even lead to the complete obstruction of the canal, thereby producing sterility. This latter possibility seems less remote in view of the fact that Whitehouse has observed two instances of pyometra, and has learned of two identical observations made by Thomas Wilson, in all of which the existing obstruction could be explained solely on the basis of a complete obliteration after syphilitic disease of the cervix. Lichtenstein reported a case of hematometra explained in like manner.

Laffont suggests that in many instances the apparent stenosis or obstruction is not actually a stricture, due to the scar of the primary lesion, but the expression of a distinct and permanent hypertrophy and hardening of the entire cervix. (This explanation would seem more acceptable for the cases of dystocia.) Such a permanent hypertrophy of the cervix is also assumed by Mrazek, who quotes the following authorities: Shaw-Mackenzie observed 31 hypertrophies in 80 cases of uterine syphilis (a figure of little significance since the term "syphilitic uterus" is used by

this writer with but scant judiciousness); Fournier in 13 chancres encountered 2 hypertrophies, Schwartz in 19 cases 5 hypertrophies. Mrazek himself ascertained a permanent hypertrophy in one-half of his 24 cases. Orth mentions a true hypertrophy as the result of the swelling of the cervix accompanying a primary sore. For the sake of completeness we may quote in this connection Bumstead and Taylor, who speak rather vaguely of an "exulcerative hypertrophy of the neck of the womb" commonly seen in the first stage of syphilitic infection.

It seems probable that in some instances this enlargement and induration of the entire cervix actually represents gummatous changes in the cervix, a point which we shall discuss later.

The diagnosis of primary cervical chancre rests chiefly upon the demonstration of living Spirocheta pallida in the scant secretion of the ulcer and upon the positive outcome of the Wassermann reaction. As to the latter, it must, however, be borne in mind that the age of the infection has a considerable influence and that the reaction, as a rule, does not become positive until about two weeks after the appearance of the chancre. Thus we have nowadays a great advantage over previous writers who based their diagnosis largely on certain findings supposed to be the end-products of an ephemeral initial lesion. Such indefinite findings as erosions, faint scars, stenosis can no longer satisfy us. Mrazek emphasizes the great difficulties of recognizing slight variations from the normal in an organ that physiologically shows striking dissimilarity not only in different individuals, but even in the same individual.

But even the ulcerated chancre does not offer enough characteristic clinical features to permit of a positive diagnosis in every instance. Mrazek points to the necessity of taking into consideration other signs characteristic of the disease. In this connection he emphasizes the importance

of a search for small papules in the vestibule or on the small labia. Oppenheim likewise observes that such papules often appear before the typical general exanthema becomes visible.

The lack of a truly typical picture of the primary sclerosis has been shown in the preceding pages and becomes even more obvious if one studies the various illustrations given in Oppenheim's atlas. There can be seen pictures of primary chancres developing in an old erosion, or soft chancres establishing themselves on healing hard chancres. As good illustrations of cervical chancres we refer to Figs. 4, 7, 8. To avoid repetition we shall consider the question of the differential diagnosis of the primary lesion of the cervix at the end of this chapter.

SUMMARY

The primary chancre of the cervix represents the best known and most common type of syphilitic affections of the female internal genitalia.

Its frequency has probably been overestimated. Statistics based on a large number of observations have never shown a frequency over 1.5 per cent. of all primary chancres found on the genitalia. It must, however, be admitted that in a considerable number of cases its presence on the vaginal portion of the cervix is overlooked.

The primary chancre of the cervix does not give rise to any noteworthy clinical symptoms. Therefore, as a rule, a search for it is made only after the appearance of the secondary exanthema. Under normal conditions the primary lesions heals with such rapidity that its existence in a large percentage of the cases can only be surmised

from certain findings which in themselves are not characteristic.

Not even during its existence does the primary chancre offer a truly characteristic and pathognostic aspect on account of its rapid and variegated evolution from an uneroded induration to an ulcer which in turn either heals quickly or transforms into an inconspicuous erosion.

Considering the absence of palpable satellite buboes and the difficulty of ascertaining the characteristic induration of its base, a suspicious looking sore on the cervix can be identified as primary hard chancre only if the Spirocheta pallida can be recovered from its surface and if the cervical lesion in due time is followed by a typical secondary exanthema. In those instances in which the cervical ulcer appears associated with other typical hard chancres in vagina or on the external genitalia a multiplicity of initial lesions must be assumed.

It seems probable that in a limited number of cases a primary chancre situated at the external os finally may lead to a stenosis as the result of contraction of the remaining scar. Pregnancy apparently plays an important role in the causation of such marked constrictions of the cervical canal which eventually may cause dystocia.

B. Secondary Lesions. There is a great scarcity of literature on this subject. The treatise by Fournier and articles by Mrazek and Rille contain general references. Oppenheim furnishes ten pictures and gives a somewhat more detailed description of secondary lesions of the cervix. Rode (1888) and, more recently, Pinkuss (No. 95) have written interestingly on the subject.

Rille and Oppenheim consider secondary manifestations on the cervix as very rare. On the other hand, Fournier, in 522 patients with secondaries of the genitals, found such lesions on the cervix in 25 patients. Mrazek, from observations made in 437 syphilitic women, estimates the frequency of cervical syphilids at 20.2 per cent. It is doubtful whether this high figure can be accepted as correct.

Fournier divides secondary lesions into erosions, papules, and ulcerations. Oppenheim distinguishes between macules and papules, and classifies the latter as lenticular non-eroded, lenticular eroded, hypertrophic diphtheric, and hypertrophic ulcerated. Rille describes 4 cases of condylomata lata seen by him on the cervix.

We have found 8 instances of secondary manifestations on the cervix among approximately 400 syphilitic women examined within the last three years.

PERSONAL OBSERVATION I

N. M. (Adm. 14252–13, colored), twenty-one years of age, entered hospital March 16, 1913, with a papulopustular eruption over entire body and other manifestations of secondary lues. Wassermann + + + +. She complained of pain in lower abdomen and back. Small, indurated ulcer in vulva. A mucous patch about $\frac{3}{4}$ cm. in diameter, round contour and slightly raised, on anterior surface of cervix. Uterus retroflexed. No gonococci in the scanty vaginal secretion.

Salvarsan, followed by protoiodide. Cutaneous lesions disappeared; mucous patch on cervix unchanged. For the purpose of microscopic study, the mucous patch is excised and a curettage performed, the latter yielding but a meager output. Spirochetes could not be found in the excised piece or the uterine scrapings.

May 16. Laparotomy for shortening of round ligaments.

May 30. Discharged in good health. Cervix appears perfectly normal.

Epicrisis. The mucous patch seen in this case differed in nowise from those observed in other parts of the body. It was slightly raised, had a well-defined contour, and was covered with a dirty gray secretion. When the later was wiped off, the purplish-red surface became visible. Microscopically, there was a dense infiltration of the subepithelial layer and an overgrowth of the papillæ.

Macules vary in size from a pinhead to that of a pea (Oppenheim) and are frequently multiple.

Papules develop from macules as the result of more pronounced papillary growth. Oppenheim believes that conditions in the vagina (temperature, moisture, etc.) favor proliferation of tissue growth and ascribes to this factor the greater frequency of papules.

We can contribute to this category the following case:

PERSONAL OBSERVATION II

H. D., (Adm. No. 14181) and 14631–13, colored, sixteen years, entered hospital March 14, 1913, with vaginal discharge in which gonococci were demonstrated, and secondary lues; Wassermann + + + +. Shallow ulceration in fourchette with indurated base. No spirochetes in excised piece. Cervix and anterior fornix covered with an eruption of small whitish, slightly raised papules. These were at first thought to have been caused by astringent douches but they persisted for more than six weeks after the douches had been discontinued and only disappeared after several weeks of mercurial inunctions.

Continuous pain in lower abdomen with frequent attacks of vomiting for which no cause could be detected in the regions of the genitals or appendix led to exploratory laparotomy on May 23. There were no adhesions in the peritoneal cavity but a small amount of clear ascitic fluid. All pelvic organs were congested, particularly the tubes; the latter were patent and did not contain any purulent secretion. Both ovaries enlarged, with white, thickened tunica albuginea. Ovarian vessels engorged. Appendix large, twisted spirally about itself. Appendectomy. Normal convalescence.

June 14. Discharged in good health.

Epicrisis. The papules of this case were, on an average, of the size of a large pinhead. They corresponded in appearance to the description given by Fournier and Oppenheim; according to these authors, the color, in some cases, is pinkish or brownish. They were spread out over the entire cervix and the anterior fornix; Fournier has also found them within the external os. Oppenheim remarks that they feel a bit harder than the surrounding tissue, but this feature was not noticeable in our case.

Neither in this nor the preceding case were there any symptoms caused by the lesions of the cervix, and both instances would have passed unobserved had it not been our custom to systematically examine every syphilitic woman entering our wards.

PERSONAL OBSERVATION III

M. H. (Adm. No. 8494–15,) colored, nineteen years old, entered hospital October 3, 1915. Menses always late, lasting five days, profuse, without pain. Never conceived. No history of primary infection. Possibly gonorrhea five months ago. General eruption two years ago. Examination: no mucous patches or skin eruption. Cervical and epitrochlear glands enlarged. Ulcer in fossa navicularis. *Mottled appearance of cervix.*

October 6. Leaves hospital before Wassermann is made.

Epicrisis. This case is not absolutely conclusive. We have inserted it here because we believe that it represents one of the stages of healing of secondary papules. The patient was undoubtedly luetic. The mottled appearance of the cervix could have been ascribed to gonorrhea but there were no other signs of gonorrheal infection present. Fournier remarks on the rapidity with which papules heal without leaving a trace, and we presume that the discoloration in our case would have given way to the normal appear-

ance within a short time. Unfortunately, in this as in so many other cases, particularly among negroes, it was impossible to keep the patient in the hospital for observation.

PERSONAL OBSERVATION IV

P. G. (Adm. No. 12139–15), colored, twenty-one years old, entered hospital December 22, 1915. Menstruation first at thirteen; regular, lasting four days, always profuse, sometimes with clots; without pain; last menstruation three weeks ago. Married three years. Has never conceived. Always well in genital sphere. Does not know of any infection. Complaining for the past week of vaginal discharge and swelling about the vulva.

On examination both small labia and the prepuce of the clitoris are found to be greatly edematous. On the inside of the left labium minus there is a whitish nodule, the size of a lentil, to which is attached a yellowish-white pseudomembrane which covers more than half the inner surface of the minor lip. This coating can readily be wiped off, and the nodule mentioned is now seen to be a plug of sloughing tissue which projects out of a small ulceration. Beneath the latter, an area of induration is palpable within the diffuse edema of the tissues.

The posterior circumference of the urinary meatus is equally edematous and bears a number of very small nodular projections which are covered with a yellowish-white coating that cannot be wiped off. The hymeneal ring is edematous. No other lesions of the vulvar mucosa. There is no tenderness other than caused by introduction of the finger or the speculum into the vagina.

The internal genital organs are normal on bimanual examination. The cervix points backward and is soft to the touch. Through the speculum, the cervix appears somewhat edematous (Fig. 2). Upon the anterior lip there is a deeply congested area just above the orifice; the latter is marked by a dark red line. The posterior lip is the seat of a round ulceration measuring about $1\frac{1}{4}$ cm. in diameter. The ulceration is raised a trifle above the niveau of the surrounding mucosa. Its contours are well defined and the borders decline into the neighboring tissue, from which they are separated by a thin red line. The

surface is slightly granular and has a yellowish, lardaceous appearance, owing to a coating with a sticky, glassy, yellowish-gray, non-offensive slough. The ulceration is seen to extend into the cervical canal. It is not painful to touch, and there is but very slight bleeding on manipulation. A copious purulent discharge with small particles fills the fornices.

Smears are taken from the surface of the ulcer and the vaginal discharge, and numerous typical Spirochetæ pallidæ are found by dark-field illumination as well as by Indian-ink preparation. Wassermann + + + +.

The specific nature of the lesion having been demonstrated, the patient is given potassium iodide internally. No local applications.

December 28. After five days of the above medication a remarkable improvement has taken place. The edema of the vulva has entirely disappeared. There is no trace left of the sloughing ulcer on the inside of the left labium minus; only a small depression which is but faintly indurated, can be discerned. The urinary meatus is still a trifle edematous, but free from the yellowish nodular excrescences. The ulceration of the cervix has changed into a clean erosion with slightly granular base and sharply defined edges. The sloughing cover has disappeared. The color of the erosion is reddish with a very faint yellowish undertone.

January 1, 1916. Patient has had three inunctions of gray ointment in addition to KI. internally. She insists on leaving the hospital. The objective improvement is still more pronounced. The eroded area is smaller than before; its level is flush with the surrounding tissue; the granulations of the base are very small; the edges fade into the neighboring mucosa. It is covered by a small amount of mucopurulent discharge which is easily wiped off. The erosion now bleeds easily on touch, and is soft and painless.

Diagnosis: Secondary ulceration of cervix.

PERSONAL OBSERVATION V

C. G., (Adm. No. 10711–15), colored, nineteen years old. Entered hospital November 18, 1915, complaining of purulent vaginal discharge which has grown more profuse and become tinged with blood in the last two days. Also has pain in pelvic

region and a sore throat. Had a stillbirth June, 1915, and has not menstruated since.

Examination reveals a typical luetic pharynx and enlarged cervical, axillary, and inguinal glands. The entire body is covered with a yellowish-brown, macular eruption. Reflexes normal. Abdomen tender on pressure in lower portion; no tumefaction palpable. Vulva and vagina diffusely reddened and bathed in mucopurulent discharge which, microscopically, is free from gonococci. Uterus and adnexa not palpable owing to resistance of patient. The cervix feels scarred and bears on its anterior surface a slightly elevated excrescence which extends to the anterior fornix. In the speculum this excrescence has, in a general way, the shape of a transverse oval. Its lower edge is about $\frac{3}{4}$ cm. above, and paralleled with, the external orifice. The surface is finely granular and rendered uneven by two fissures of which the lower one is quite deep and runs into the other at an acute angle. The color of the affection is deep yellow with a net-work of fine red lines in the depth of the tissues. (See Fig. 3.) Spirochete pallida in smear from surface seen by dark-field illumination. Wassermann $+ + + +$.

Diagnosis: Secondary syphilitic ulceration of cervix uteri.

November 24. Patient refuses treatment and leaves hospital.

January 27, 1916. Patient enters hospital again (Adm. No. 14116–16) on account of painful tumor of tibia diagnosed as syphilitic periostitis. She has had no specific treatment since leaving the hospital. Gynecologic examination reveals very marked changes from former findings. The palpating finger now finds the anterior lip of the cervix considerably enlarged and excessively soft. The anterior lip seems puffy. The unevenness of the surface noted previously is hardly perceptible. The posterior lip has normal configuration but feels rather hard. Pressure upon the left pelvic wall is very painful and a hardened bloodvessel can plainly be palpated (vaginal artery?). The upper part of the vagina gives to the finger the impression of fulness or swelling for which the French use the term "*empâtement.*"

Speculum examination discloses the lesion on the anterior lip to be one-half again as large as before. While the shape, on the whole, is the same, the ulcer is much higher, and the color is distinctly different; it is no longer yellow, but rather red, interspersed with grayish areas. The affection now extends to

the posterior lip as well. The latter is only slightly enlarged, but the surface is no longer smooth and even and presents a marked yellowish glistening appearance.

PERSONAL OBSERVATION VI

M. B. (Adm. No. 10612–16), colored, seventeen years old. Entered hospital November 16, 1915. Previous health fair. Menstruation regular, scanty. No conceptions. First intercourse about a year ago. No history of specific infection. Has had a yellowish discharge from vagina for last seven months. Troubled, for past four months, with severe pain in lateral portions of lower abdomen, lumbar regions, and both thighs.

General examination negative, except for the presence of enlarged cervical glands. Tenderness on pressure over lower abdomen, without muscular rigidity. Vulva and vagina bathed in purulent discharge (in which, later, gonococci were demonstrated). Uterus small, retroverted; adnexa normal. Cervix feels eroded and granular, but soft. Speculum: entire cervix covered with a thick, whitish-gray pseudomembrane which cannot be wiped off easily; the underlying surface bleeds readily.

A vaginal douche with bicarbonate of soda is ordered and the patient examined again the next day, when the following observation is made. The entire posterior surface of the cervix is the seat of a growth which anteriorly surrounds the external orifice in a semilunar fashion and extends posteriorly to the fornix. Laterally it almost reaches the edges of the cervix. It is raised $\frac{1}{4}$ to $\frac{1}{3}$ cm. above the rest of the cervix, and, in general, has a quadrangular shape. Its surface is uneven from the presence of large and small nodules between which there are irregular fissures. The nodules range in size between that of a pinhead to about half the size of a pea. The largest is situated in the median line at the external orifice. In the posterior portion near the fornix the nodules become more uniform in shape and resemble granulations. The edges show a steep declivity toward the neighboring mucosa, which apparently is perfectly normal. In the right upper corner the edge forms an overhanging projection. The color of the entire growth is a peculiar yellow which, however, is not due to any covering or coating, but resides in the tissue itself. The yellow color is relieved by

fine lines of pink which, from the distribution, see to indicate bloodvessels. (See Fig. 1.)

The overhanging edge of the growth mentioned above, is snipped off for histologic examination, and a smear is made of the scant serous secretion from the surface. The ultramicroscope reveals in the latter a fairly large number of typical Spirochete pallida.

Diagnosis: Syphilitic ulceration (secondary) of the cervix uteri. Wassermann test could not be made nor specific treatment instituted as patient insisted on leaving the hospital.

Histologic Examination of the Specimen: 1. Tissue stained by Levaditi's (second) method shows several typical Spirochete pallida; in addition a number of colonies of diplococci, morphologically identical with gonococci, are found in the more superficial layers of the section.

2. Tissue stained with hematoxylin-eosin, by Unna's orcein method, and Weigert's fibrin stain shows a dense granulamatous infiltration of lymphocytes, plasma cells, and polynuclear leukocytes, and a large number of newly formed capillaries, many of which show endothelial thickening. For further details we refer to the description given in Chapter III.

Patient reënters hospital January 27, 1916 (Adm. No. 13656–16). She has had no treatment in meantime and denies having had sexual intercourse. Complains of backache, pain in left hip, and profuse vaginal discharge. Amenorrhea in last two months. Marked cachexia. Left leg flexed in hip-joint. Attempts at straightening out limb impossible because of excessive pain. Numerous small, indolent inguinal glands.

Vaginal Examination. About one inch above the vaginal entrance the finger is arrested by a growth which completely fills and considerably distends the upper part of the vagina. This tumor occupies the cervix and transforms it into a cauliflower growth the size of a child's fist. The consistency as a whole is moderately firm but in two or three places there are distinctly softer, almost fluctuating areas. Nowhere, however, can the finger penetrate into the tissues as in carcinoma. The base of the tumor at the cervicovaginal junction is quite hard. The surface, on the other hand, is very soft, almost mushy, and can readily be scraped off with the finger. This manipulation caused but very little bleeding, but is accompanied by profuse seropurulent discharge. The external os can not be

located with certainty. Both parametria are infiltrated as in carcinoma. Palpation of the left pelvic wall and along the course of the left vaginal artery is extremely painful.

The tumor is so large that speculum examination affords only a partial view. The color is whitish, medullary, with a yellowish tint.

Rectal examination reveals a very small uterus in retroflexion; tubes and ovaries small.

A small piece of the tumor was excised and showed, microscopically, the typical picture of a gumma. *Wassermann was negative.*

PERSONAL OBSERVATION VII

A. T., (Adm. No. 4154–15), colored, fourteen years old. Entered hospital June 27, 1915. Menstruation regular since the age of twelve. Never pregnant. Date of primary infection unknown. Complaining, for past two weeks, of burning pain on urination, yellowish discharge from vagina, small ulcerating "lump" in vulva; sore throat.

Examination. General papular eruption. General adenopathy. Mucous patches in mouth. Typical pharyngitis. Small indurated ulcer in right labium majus. Shallow, punched-out ulceration in fourchette. Wassermann + + + +. No vaginal examination. No gonococci in smear. Diagnosis: Lues, possibly also soft chancre. July 1, 1915. Specific treatment instituted. July 24. Improved objectively and subjectively, except for soreness near rectum.

September 16. Discharged.

Readmitted September 24, 1915 (Adm. No. 8339), on account of persistent vaginal discharge. Speculum examination: A narrow semilunar area of redness around left angle of external os but separated from it by normal mucosa. Two other, smaller reddened areas on posterior surface of cervix. These three areas are flush with the level of the mucosa, are covered with intact epithelium, and look like roseola on the skin. A small, round, clean ulcer in posterior fornix which bleeds slightly when touched with an instrument. (See Fig. 9.) Fairly extensive luetic ulceration in vulva. Mixed treatment.

October 14. Discharged.

November 15, 1915, Readmitted (Adm. 9271) for soreness

about rectum. Now has condylomata lata around anus. Inunctions and KI.

December 13. Speculum: Cervix normal. Ulcer in fornix and reddened areas have disappeared; only one rather pale spot remains. The cervical mucosa is swollen and protrudes slightly; it is dark reddish-brownish-yellowish in color.

PERSONAL OBSERVATION VIII

E. N., (Adm. No. 11164–15), colored, twenty-four years old, nullipara, entered hospital November 29, 1915. She has ulcers in nasal septum, extensive ulcerations and edema of vulva and broad vegetations upon perineum. There is a constriction of the vagina which has rendered intercourse impossible for the last eight or nine months. Very marked picture of late secondary or early tertiary stage.

Copious mucopurulent discharge in which two Spirochetæ pallidæ are demonstrated in ultramicroscope.

Cervix small; external os normal. Two shallow, clean, dark red ulcerations with well-defined edges upon anterior surface of cervix. (See Fig. 5.) At a later examination, which happened to be made during menstruation, these ulcers bled freely when touched with an instrument. Patient was subjected to specific treatment under which the ulcers disappeared within four weeks.

Diagnosis: Late secondary ulcers of cervix.

From these eight observations, supplemented by the experiences of others in literature, it is now possible to sketch the picture of secondary manifestations upon the cervix. Their first appearance seems to take on the form of macules. These, analogous to rashes and eruptions upon cutaneous surfaces, constitute scattered accumulations of the parasite in the mucosa of the cervix which call forth certain local reactions. The subepithelial layer at the affected site becomes densely infiltrated with lymphocytes and plasma cells, the epithelium itself becomes thickened by overgrowth of the papillæ and downward extension of

the epithelial cells, and the bloodvessels are dilated. The thickened epithelium gives the affection its peculiar opaque or pearly-white color. The superficial cell layers eventually become macerated and are cast off which leads to erosion. The latter has a pinkish or brownish color, but more often it is covered with a grayish exudate, which though small in amount abounds in spirochetes. The size of these mucous patches is small and their outline well defined. It depends upon chance whether they are single or multiple, and upon the degree of epithelial thickening whether or not they are elevated above the surface of the surrounding mucosa. The subepithelial infiltration is too slight to produce any appreciable difference in the consistency of the mother tissue; and the local tissue reaction on the whole is too mild to cause any symptoms. Larger macules or confluences of smaller ones are termed mucous patches. This form of secondary lesion is represented in our first observation.

Between the macule and the papule of the cervix there is but a difference of degree. The papule represents a more pronounced epithelial proliferation of an everting type so that these structures stand out plainly above the level of the surrounding mucosa. They are round or elliptical and very small in size. Those observed in our second case were of the size of pinheads, but according to Fournier, larger papules may be formed by the blending of several smaller ones. If the hypertrophy of the epithelium becomes excessive the papule becomes a condyloma latum. Rille records four instances of this kind. They are usually multiple, as in our Case II, and may be located anywhere upon the cervix, even within the external os. As long as the epithelium is intact, the surface is smooth and the color white or pearly. The destruction of the superficial cells is, however, only a question of time, and then the papule becomes eroded. The eroding process starts, as a rule, in the centre of the elevation. In this stage the papule is pinkish or reddish-

brown in color; the centre is somewhat depressed and surrounded by a symmetrical and slightly raised circle. Oppenheim, from whom this description is cited, also calls attention to their consistency, which is a bit harder than the surrounding tissue. We were unable to distinguish the papules in our case by palpation, but presume that larger papules, particularly condylomata, would impress themselves on the exploring finger.

The secretion of these papules, while highly infectious, is much too scanty to be perceived by the patient, and there is no pain nor any enlargement of the cervix, so that the discovery of these lesions is only a matter of accident.

Moreover, the healing process is so rapid that, within a very short time, no trace reveals the previous affection. We believe that the mottled appearance of the cervix in our third observation represents one of the final stages in the evolution of cervical papules. This patient was undoubtedly syphilitic even though Wassermann was not made. The aspect of the cervix was unlike any discoloration we had ever seen; gonorrheal macules, in particular, could be excluded.

The third form of secondary lesions of the cervix is ulceration. Fournier speaks of superficial ulcers, usually located near the os, which are red in color, vary in size, and possess no characteristic features. Our Cases VII and VIII obviously belong to this group. In Case VII three ulcers were in the process of healing, while the fourth, at the posterior cervico-vaginal junction, still persisted. There was no reaction on the part of the cervix, and specific treatment eventually brought about complete disappearance of the lesion. In Case VIII two ulcers were found on the anterior surface of the cervix. There were other lesions in this patient which appeared to belong to the tertiary stage, but the ease with which typical spirochetes were found in the vaginal secretion made this assumption doubtful, as we know that the

parasites are not often found in tertiary lues. We therefore concluded that we had to deal with late secondaries. Both patients had profuse vaginal discharge which probably was caused by the ulcerations. This seems to be the only symptom connected with this group of ulcers.

The ulcerations observed in Cases IV, V, and VI require separate consideration. In Cases IV and VI they were located on the posterior, in Case V on the anterior lip of the cervix. In all three they represented exuberant growths of considerable size, covering the greater part or the whole of the affected lip. Their shape was oval or quadrangular. Those on the posterior lip extended to the external os; in Case IV the extension of the process into the cervical canal was evident. Their consistency was soft; in Case V excessively so, and in none of the cases was there any induration of the cervical tissues beneath the lesions. The surface was uneven from the presence of irregular nodules or fissures. The edges showed a steep declivity, and where they met with the normal mucosa there was, in places, a thin red line of demarcation. In Case V the lesion was covered with a thick grayish-white pseudomembrane which could not readily be wiped off, but was removed easily enough by an alkaline douche.

All 3 cases showed a characteristic color which to our knowledge is not found in any non-specific affection. This discoloration is a marked yellow or whitish-yellow which is obviously due to the fatty degeneration of the superficial cell layers. Within the yellow, there is an undertone of red or pink distributed in the form of dots or fine lines which, to our minds, represent the many newly formed and dilated capillaries. There was no pain either spontaneous or on touch, but in all cases there existed a profuse mucorpurulent discharge with a considerable amount of detritus. There was a sickly odor of the discharge, but not the stench we encounter in carcinoma or necrotic myoma. Bleeding was

insignificant and occurred only when the lesion was irritated mechanically. These lesions are undoubtedly of a progressive character, as is so well illustrated in Case V and VI where a marked change for the worse was noted. It seems highly probable that the ultimate outcome would be a permanent disfiguration of the cervix.

Pinkuss (No. 95) records a well-observed case of a mucous patch on the anterior and an ulcer on the posterior lip of the cervix. This ulcer developed within seven weeks from small beginnings into a large ulceration of a yellowish, glistening color, with well-defined contours and raised edges. Bleeding occurred repeatedly in the periphery of the ulcer. In addition, there was bleeding from the uterus which persisted for several months.

The behavior of healthy structures in the vicinity of secondary ulcers of the cervix is not uniform. Fournier is quite certain that there is no enlargement in the size of the cervix and no infiltration, in contradistinction to Siredey who mentions induration of the cervix and posterior vaginal wall. Rode (1888) records a pronounced edema of the fornices which is probably identical with the diffuse edema (*empâtement*) described by Pinard (No. 94) and Franceschini as pathognostic of tertiary lesions of the uterus. There is, however, no sharp border between secondary and tertiary lesions and the clinical terms secondary and tertiary are nowadays retained merely for the sake of convenience. This *empâtement* which impresses the exploring finger as a peculiar kind of puffiness or fulness, was present in our Case V, and we believe to have proved that this latter case represents a secondary affection.

SUMMARY

Eight personal observations have been added to the few cases, found in literature, of secondary

lesions of the cervix. Syphilis manifests itself upon the cervix in the form of macules, papules, and ulcerations. These forms probably represent three successive stages in the development of a lesion caused by scattered accumulations of the Spirocheta pallida in the squamous mucosa of the cervix. The parasite can readily be recovered from the secretion of any of the three forms, and this explains the great infectiousness of secondary lesions. Wassermann is positive in this stage. Macules and papules have no symptomatology of their own while ulcers may give rise to profuse yellowish discharge. Occasionally, a peculiar puffiness of the fornices (*empâtement*) may be present. The leukoplasic appearance of macules, the characteristic form of papules, and the typical yellowish color of ulcerations render diagnosis comparatively easy. Secondaries in other parts of the body form a valuable aid. Cervical lesions, as a rule, heal quickly and may disappear without leaving any traces. Specific treatment, energetically applied, brings about resolution in a very short time.

C. Tertiary Lesions. The earliest reference to tertiary lesions of the cervix dates back to 1755, when Astruc, in his celebrated treatise on *Venereal Diseases*, described the "venereal scirrhus" which often degenerates into cancer and gradually produces pain, twitching, and ulcerations. There followed Lagneau (1828) (No. 52) and Duparcque (1837) (No. 25), and, after the lapse of several decades, a number of writers, among whom may be mentioned Montanier and Velpeau (1862) (No. 75), Feodoroff (1866), Deprès (1870), Despeyroux (1872), Whitehead (1875), Barré (1876), A. Martin (1878), Nundin (1885), Doléris (1890), and two

American authors, Henry Morris (1874) and Otis (1883). Not all of these cases can be accepted without reservation. In some of them, *e. g.*, the observation of Whitehead, a clear distinction between secondary and tertiary lesions is lacking. A case of Lebert, mentioned by Laffont without exact bibliographic reference, and frequently quoted in literature, refers to the postmortem findings in a luetic woman in whom gummata existed in cervix, uterus, and ovaries. In view of the importance of such an observation for our subject we have endeavored to find the original publication, and can only state that no mention of this case is made by Lebert in his *Physiologie Pathologique* (1845) nor in his *Traité Pratique des Maladies Cancéreuses* (1851), in which work he discusses in detail the various pathologic lesions which may be mistaken for cancer. Berkeley Hill, another writer who has frequently been quoted, merely states: "Gummata and general induration with contraction of the cervix are sometimes found in women who have a long-standing syphilis, and will disappear when subjected to appropriate treatment." Mauriac (1890) quotes Fournier as saying that he sees about half a dozen tertiary lesions of the cervix every year and that these are always ulcerated. Heitzmann (1879) furnishes the picture of a cervical gumma which was later reproduced by Oppenheim. Rode's three observations (1888) include gummatous ulcers. Neumann (1896) refers to a case of cervical gumma seen by Mrazek and for himself simply states: "From personal experience I cannot doubt the existence of a gumma or gummatous process on the neck of the womb."

But after all, most of these observations were so indefinite that as late as 1908 Oppenheim was forced to admit that very little was known concerning gummatous processes on the cervix.

The appended collection of case reports contains twenty-one instances of cervical lesions ascribed directly or indirectly

to tertiary luetic alterations. Three of the cases are of historical interest. They have been quoted practically by every writer on the subject. Lagneau's observation (1828) gives a good description of a cervical lesion which may be accepted as luetic. Duparcque's classical report (1837) is interesting in that it brings up two points which to date have played an important role in the question of tertiary cervical lesions, viz., their resemblance to malignant growths, and the final confirmation of the diagnosis by the striking effect of specific treatment. The third case, observed by Meirieu but published by Duparcque and always incorrectly quoted under the latter's name, seems the least acceptable of the three.

In the case reported by Montanier (1862) there are strong indications that uterus and cervix actually contained some gummatous growths. The remaining seventeen histories comprise publications of the last two decades.

We have had the opportunity to observe the following six instances of tertiary lesions on the cervix.

PERSONAL OBSERVATION IX

Mrs. J. P. F. (Priv. Rec. No. 884), forty-six years old. One confinement twenty-two years ago. One miscarriage twenty-one years ago. Ailing since establishment of menopause three years ago, with general malaise which has alternately been diagnosed as walking typhoid, tuberculosis, and "womb trouble." Finally an operation was proposed. For the last three months she has had constant girdle pain, intercostal neuralgia, backache, and sense of fulness in abdomen. Has lost in weight and strength. Sleep is disturbed by pain. No headaches. Digestion and urination normal.

Patient is emaciated and anemic. Abdominal walls thin, gaseous distention. Skin of entire body dry. Glands palpable only in supramaxillary angle and along edge of sternocleidomastoid. Old perineal tear of second degree with cicatricial contraction, rendering entrance to the vagina rather narrow. Otherwise palpatory findings of genital organs fairly normal.

Speculum examination reveals a moderate amount of grayish,

thin, foamy discharge. There is an annular erosion around the external os which presents a medullary appearance. It is about $\frac{3}{4}$ cm. in width and is slightly raised above the niveau of the cervix. The color is of a peculiar whitish yellow within which a number of fine bloodvessels can be seen. The surface is finely granular. It does not bleed readily upon manipulation. Its consistency is very slightly firmer than that of the rest of the cervix.

The appearance of this erosion together with the presence of cachexia suggested the diagnosis of syphilitic lesion and although the Wassermann test was negative, mixed treatment was instituted. After two months of this treatment patient was greatly improved in every respect and was gaining in weight and strength. The erosion was still present but had altogether lost its yellowish color and was no longer raised above the rest of the cervix. There was a small polypus in the external orifice. The vaginal discharge was slightly increased in quantity but more nearly normal in quality.

During this time she was also seen by an internist who by physical and *x*-ray examination found an old encapsulated tuberculous cavity in the left lung. She was also sent to an orthopedist because of a slight gibbus which has given her some pain. The orthopedist independently diagnosed this as being of syphilitic nature.

As far as the erosion was concerned the specific treatment had resulted in the disappearance of the luetic lesion without, of course, influencing the preëxisting erosion, and as this was rather extensive and the appearance of the small polypus suggested fungosities higher up in the cervix, amputation and thorough currettage was performed. The cervical wound healed by primary union. Under continuous administrations of mercury and KI, patient recovered completely, and one and a half years later was found to be in perfect health.

The microscopic picture of sections of the uterine scrapings and the amputated cervix showed no typical features. In particular there were no marked perivascular or endarteritic changes, and the subepithelial infiltration with lymphocytes was but of moderate extent.

Epicrisis. The diagnosis of gummatous ulceration engrafted upon a simple erosion in this case is based upon the characteristic appearance of the lesion and the cachexia

of the patient. The success obtained by a very mild antiluetic treatment is an additional corroboration. The negative history and the negative outcome of the Wassermann test, which was taken only once, do not militate against the diagnosis. The encapsulated tuberculous cavity in the lung could not have produced so marked a cachexia. Moreover, the patient spent several months in a health resort in Colorado without receiving any benefit. Finally, the diagnosis of the orthopedist who knew nothing of our suspicion, must be considered a weighty argument.

PERSONAL OBSERVATION X

B. L. (Adm. No. 7307–13), white, thirty years old. She was infected with syphilis at the age of fourteen and is now in the tertiary stage of the disease. Has had one stillborn child at term and one miscarriage. Menses normal. She has a beginning optic neuritis and presents numerous large scars of old luetic lesions over entire body.

Her present illness began three weeks prior to admission with hemorrhage following intercourse. Within a few days the bleeding changed into a profuse, bloody, foul-smelling discharge, and this has persisted ever since. In addition she has had severe pain in right lower abdomen which has confined her to bed.

September 13, 1913. Gynecologic examination revealed the external genitalia reddened and irritated. Large amount of brownish-bloody, purulent discharge. Cervix transformed into a large, irregularly-shaped, hard, nodular mass. Fundus uteri not distinctly palpable, turned backward, and apparently bound down by adhesions. Both parametria infiltrated and hard, more so on the right side. No tenderness on pressure. Through the speculum the cervix appeared to be covered by necrotic, greenish tissue. Blood was seen oozing from several points of the surface. A provisional diagnosis of carcinoma was made and antiseptic douches ordered pending the microscopic examination of a piece of the tumor removed with scissors.

September 17, 1913. Discharge held in check by one douche with potassium permanganate daily. Report of laboratory examination: chronic inflammatory changes; *no carcinoma*.

In view of the history of the case, the ocular findings, and the

strongly positive result of Wassermann a diagnosis of gumma of the cervix was now made and deep injections of benzoate of mercury were ordered.

September 29, 1913. After seven of these injections, examination was repeated and the uterus now found distinctly palpable, fundus approximately of normal size, anteverted, and movable. The cervix was still strikingly large, especially the anterior lip, which still presented a nodular, hard, irregular outline. In the speculum the change in the appearance of the cervix was quite marked. The surface was of red color and covered with intact epithelium except where the tenaculum had been fastened in the anterior lip at the time of the exploratory excision. Here a small ulcerated surface resulted which was partially covered with a whitish-greenish membrane. The vaginal discharge was purulent without any bloody admixture and free from offensive odor. Dark field examination of the cervical secretion was negative as to spirochete.

On the left side, and rather high up, a soft, slightly tender tumor of the size of a walnut was palpable, probably the enlarged and inflamed left ovary.

In addition to intramuscular injections of mercury and internal administration of potassium iodide, salvarsan was given on October 2, and two days later the cervix, though still somewhat nodular and irregular in outline, was felt distinctly softer than formerly. In the speculum the cervix was now found completely covered with epithelium and of a pale pinkish and in places slightly purple color. Immediately around the orifice and almost over the entire surface of the anterior lip there were darker red, irregularly-shaped areas which, however, were not eroded but showed intact epithelial covering. Rubbing with a sponge caused slight punctate bleeding. The mass to the left is still palpable and tender, but smaller.

October 13, 1913. Under continued specific treatment the condition of the patient, both general and local, has vastly improved. The left ovary is normal in size and no longer tender. The cervix is markedly softened and decreasing in size. Manipulations with instruments cause no bleeding. Patient demands release.

Patient returned to the hospital in 1914 and 1915. On both of these occasions gynecologic examinations were made and the condition of the genital organs, in particular of the cervix, was found to be perfectly normal.

Epicrisis. The diagnosis of gumma could be made without any difficulty. The prompt effect of specific treatment both upon the local lesion and the marked cachexia of the patient was noteworthy.

PERSONAL OBSERVATION XI

R. W. (Adm. No. 7058–15), white, aged fifty-four years. Entered hospital August 31, 1915. Menopause since November, 1914. One "menstruation" of two days in August, 1915. Five children; of these one was premature and died after three days. "Paralytic stroke" twenty-three years ago. Suffering from vertigo, somnolence, headaches, diplopia, and convulsions. Is under the care of the neurologic service with the diagnosis of cerebrospinal lues, and referred for examination to the gynecologic department on account of profuse, greenish, purulent vaginal discharge.

The microscopic examination of smears proved the absence of gonococci. Bimanually the uterus was found enlarged and hard; the adnexa were normal. Through the speculum the anterior surface of the cervix was seen to be covered by fairly large and dark red blotches in such a way that only a few small islands of normally pale mucosa separated the areas of discoloration. The latter seemed a trifle raised, some with intact epithelium, others very finely granular in appearance. Their edges were not well-defined. Manipulations with speculum and instruments caused no bleeding. The posterior surface of the cervix was unaffected save one blotch just below the external orifice. The rest of the vagina was perfectly normal. (See Fig. 6.)

Diagnosis: As senile vaginitis could be excluded because of the appearance, size, and location of the reddened areas, the absence of bleeding on touch, and the freedom from vulvar irritation from the discharge, the affection was diagnosed as a syphilitic lesion, and specific treatment recommended. Patient, however, refused to remain in the hospital and has been lost out of sight.

The well-established cerebrospinal lues of this patient suggests the interpretation of the cervical lesion as a tertiary manifestation.

PERSONAL OBSERVATION XII

Mrs. J. K. (Priv. Rec. No. 905), aged fifty-three years. Nine years ago anterior colporrhaphy and perineorrhaphy. Three children, no miscarriages. Infected by husband about fifteen years ago; claims to have had "an abscess inside" at that time. No indication of gonorrhea in the twelve years that the patient has been under our observation. Menopause began five years ago and was completed three years ago. In March, 1913, troubled with itching and "rash" on vulva, which has persisted for the last month in spite of douches. Postoperative result excellent. In the upper part of the vagina, both anteriorly and posteriorly as well as in the right side, a number of slight elevations are felt in the mucosa of the vagina which, in the speculum, present the appearance of warts. Small amount of thin grayish discharge. Senile cervix covered on the right half with the same warts. Wassermann negative. Astringent treatment for several weeks; also cauterization of a number of the larger warts. Two months later marked increase of all these excrescences, of which a small number is now also found on the vulva. Examination causes slight bleeding. Patient states that her husband has had a similar condition on penis. Patient was lost sight of and seen again two years later, July, 1915, when these vegetations were found in the old location but smaller in size. They had now extended to the posterior cervical lip. In the speculum the elevations were covered with a white film resembling frosting. Throughout the anterior vaginal wall there is a faint whitish discoloration. Patient has again disappeared from view. Microscopic report made by Dr. R. Buhman, April 7, 1913, reads: Sections from tissue show a proliferation of the epithelium on a connective-tissue base with the formation of many capillaries in this epithelial proliferation; these capillaries show an endothelial cell increase. The epithelium is in a state of hyperkeratosis. The subepithelial connective-tissue is infiltrated with a fairly large amount of round cells.

Epicrisis. The diagnosis of syphilis in this case is somewhat doubtful. It is mainly based on the statement of the patient that her husband has had "a bad disease," for which he had received treatment, and that there were warts on his

penis. The history of the patient did not suggest syphilis and Wassermann was negative. The vegetations in the vagina and upon the cervix did not resemble condylomata acuminata, and there had been no clinical signs of gonorrhea in the twelve years the patient had been under our observation. On the other hand the whitish appearance of the excrescences, their persistence and tendency toward extension suggested leukoplasia, and this assumption was still further strengthened by the histologic picture which plainly showed a hyperkeratosis of the mucosa and a proliferation of the capillaries and infiltration of the connective tissue. The endarteritic changes and the round-cell infiltration argue against the assumption of a simple new growth, a papilloma, and may be adduced in favor of an inflammatory lesion. We, therefore, feel justified in citing this case as probably one of cervical leukoplasia on luetic basis.

PERSONAL OBSERVATION XIII

A. N. (Adm. No. 8584–13), aged thirty-six years, colored, entered the hospital for the relief of a total prolapse. Wassermann + + + +. Vaginal hysterectomy and Goffe's cystocele operation was performed on October 18, 1913. The removed uterus was large and fibrous and contained a small intramural fibroid posteriorly. There was a small and hard mass palpable within the tissue of the cervix, the mucosa of which was perfectly normal. Because of the syphilis of the patient, this mass created suspicion which was justified by histologic examination. The details of the microscopic examination have been given in the chapter on Histology. We will state only briefly that the mass in question proved to be a beginning typical gumma with marked round-cell infiltration, proliferating capillaries with pronounced endarteritis, and giant cells. (See Figs. 13, 14, 15.)

Unfortunately the gross specimen is lost. The case antedated our investigations into syphilis of the internal genitals and only the microscopic slides were kept for future reference.

From these, however, the diagnosis of beginning gumma cervicis is unimpeachable.

The most interesting and important observation made by us throughout the course of our investigation is the case whose history and findings have been reported as Personal Observation VI. As the final and most remarkable developments in this case occurred after the completion of this paper, only the briefest outline can be inserted. The reader who is interested in malignant syphilis of the uterus will find a detailed consideration of this case in a later publication in *Surgery, Gynecology and Obstetrics*.

It will be remembered that the patient was a colored girl, aged seventeen years, with an extensive secondary ulceration upon the posterior lip of the cervix. (See Fig. 1.) Spirochetes were found in the secretion and the tissues of the ulcer. (See Fig. 2.) Wassermann was strongly positive. She left the hospital before treatment was instituted, but returned two months later, markedly cachectic and with a painful contracture of the left hip-joint. The ulceration of the posterior lip had grown into a large cauliflower tumor, the size of a child's fist, which occupied the entire cervix. (See Fig. 11.) Wassermann was negative and carcinoma was ruled out only after the microscopic examination of an excised piece proved the diagnosis of gumma. In spite of specific treatment the patient grew from bad to worse and finally died, February 18, 1916. Autopsy revealed the presence, in the abdominal cavity, of about two quarts of pus originating from a large retroperitoneal abscess; a small perforation was found at the right side of the sigmoid. The cervical gumma was unchanged. Both parametria were diffusely infiltrated. The infiltrating process had extended into the posterior pelvic connective tissue and had attacked the anterior surface of the sacrum. Almost the entire right upper quadrant of the sacrum was necrotic, and wide openings led into the spinal canal posteriorly and into the acetabulum on the left side.

In this case the disease ran its entire course from the initial sclerosis to the gumma in less than a year, and the rapidity of transition from the secondary into the tertiary stage was particularly noteworthy. The virulency of syphilis in this patient reminds one of the fury of the disease when it first invaded Europe. The syphilization of the world has made cases such as ours extremely rare, even among negroes in whom syphilis assumes more severe forms than in white patients.

Tertiary syphilis of the cervix, as of any other part of the body, appears most frequently in the form of a gumma. According to Oppenheim the gumma develops primarily from one or several nodules, and this is undoubtedly true in a number of instances. Our own Case XIII illustrated beautifully the very incipiency of a gumma. We found, in this case, a small hard mass in the anterior lip of the prolapsed cervix in a syphilitic woman, and the microscopic examination revealed several foci of infiltration of lymphocytes, plasma cells, and giant cells with new formation and endarteritic changes of the capillaries. Winckel quotes a case of Mesnard in which several gummatous nodules in the cervix of a syphilitic woman necessitated deep incisions during labor. Still more pronounced is the case reported by Montanier and Velpeau in which the cervix was transformed into a hard and nodular mass about the size of the head of a fetus of seven months. This tumor was freely movable and not ulcerated. Under specific treatment the cervix resumed its normal shape. In some instances, finally, the lesions are fungoid or papillomatous without being ulcerated. (Barthélemy.)

In the majority of instances, however, the gumma does not preserve its integrity. In syphilis the newly-formed granulation tissue becomes less resistant as the disease advances, and in the tertiary stage we observe a constantly increasing frailty and perishableness of the cells whereby

they undergo softening, fatty degeneration, and necrosis. These retrogressive changes combined with the ubiquitous bacterial infection transform the lesion into an ulcer, and this is by far the most common form in which the tertiary process manifests itself. Between ulcerated gumma and gummous ulcer there is only a difference in degree of tissue proliferation. The ulcerated gumma represents a more or less voluminous tumor as, for instance, in our Cases X and VI. In the first of these it was an irregularly shaped, hard, nodular mass; in the second it assumed more the shape of a cauliflower tumor of the size of a child's fist. To this category belong also the cases of Lagneau, Duparcque, La Torre (No. 58), Wegscheider (Nos. 137, 138, 139), and O'Day (No. 83). The last-named observation has in common with our Case VI a well-marked infiltration of the parametria. The consistency of these ulcerated gummata is hardest near the base; the consistency of the more superficial portion varies according to the intensity of the necrotic process. The same factor modifies the appearance of the tumor. In Case X it was greenish; in Case VI various shades of red, gray, and yellow could be seen. In both cases there was a profuse bloody purulent discharge. On the whole an ulcerated gumma of the cervix appears very much like any other necrotic tumor in this locality. A few differentially important points will be considered later.

The gummous ulcer, of which our Case IX is a typical illustration, forms the bulk of observations recorded in literature. In this form the tissue proliferation is less marked but the tissue destruction is more pronounced. A certain amount of new tissue formation takes place, and this is responsible for the fact that most ulcers are elevated above the level of the surrounding mucosa. That is to say, the edges of the ulcers are infiltrated and raised while the centre is more or less deeply hollowed out by necrosis and ulcera-

tion. Occasionally, forms may be seen halfway between ulcers and gummata. Thus, Barthélemy describes one of the moulages in the collection of the Hôpital Saint Louis in Paris as "a turgescent, proliferating ulcer" which resembled the "elevated ulcer" described by Verneuil.

Gummous ulcers may involve one or both cervical lips (Neumann, Oppenheim, Barthélemy) and seem to have a tendency toward establishing themselves in preëxisting erosions, in which case they may surround the external os in an annular fashion, as, for instance, in our Case IX.

In the case of La Torre (No. 58) the gummous ulcer was located upon a cervical ectropium. Oppenheim shows four pictures of ulcerated gumma. In one of them the lesion occupies the cervix of a prolapsed uterus, in another the posterior lip bears an ulcerated and the anterior lip an intact gumma which presents fluctuation. Such a multiplicity of gummatous processes is not uncommon. In Spinelli's second case (No. 109) there were gummata on the cervix and in the vaginal wall. In Wegscheider's case (No. 138) the cervical lesion was associated with a tertiary ulcer on the thigh and gummata in the liver. In other cases of cervical gumma tertiary lesions coexist upon the external genitals.

The cervical ulceration may by continuity involve the vaginal fornices, as in the case of Madlener (No. 68), or extend into the cervical canal, as in the observations of Franceschini (No. 30), Barthélemy (No. 3), and Wolter (No. 145). Laffont argues from this, that ulcerative luetic processes may establish themselves within the uterine cavity. The unique observation of Hoffmann (No. 40) confirms this contention. In this case the anterior cervical lip was the seat of a tumor the size of an apple, necrotic, and waxy in appearance, which, on microscopic examination, proved to be a gumma. At autopsy a thick layer of gummatous tissue was found to extend from the cervix through

the cervical canal into the uterine cavity and to substitute completely the endometrium.

The yellowish color is characteristic of luetic lesions, but in addition all shades from a whitish or a dirty gray to a dark red and even purple may be seen. Occasionally diphtheroid pseudomembranes are present, beneath which the surface appears fatty and glistening. Manipulation causes no pain, but may give rise to free bleeding. There is, as a rule, no reactive zone in the surrounding mucosa.

Cervical gummata may heal spontaneously with more or less destruction of tissue and a proportionate amount of scar formation. Local treatment is of no avail, but general specific treatment brings about a speedy resolution. This quick response to antiluetic therapy forms one of the most important factors in the correct diagnosis of these lesions.

SUMMARY

A fairly large number of tertiary lesions of the cervix has been recorded in literature. To these, six personal observations have been added, one of which is not conclusive. The essential form is that of a gumma which, in the majority of instances, undergoes necrosis and ulceration. If the tissue proliferation predominates, we speak of gumma; if retrogressive changes prevail, we speak of tertiary or gummous ulcer. The process may involve the vagina or extend into the cervical canal and is frequently associated with similar lesions elsewhere. The consistency is firm but becomes soft under the influence of tissue necrosis. The most characteristic color is yellow though various other shades may be observed. Bleeding or profuse mucopurulent discharge is present in most cases, but no pain. These lesions, which may heal spontaneously

with the formation of scar tissue, disappear very quickly when specific treatment is instituted. Local treatment is altogether useless.

D. Differential Diagnosis of Syphilitic Lesions of the Cervix. The prototypes of the three stages of syphilitic infection, the chancre, the macule or papule, and the gumma, offer no particular difficulty to the diagnosis, but ulcerative changes are apt to obscure their characteristic features. It may, then, be helpful to remember certain general characteristics of luetic lesions of the cervix, viz.:

(*a*) Specific ulcers, as a rule, produce very little secretion; only extensive tertiary ulcers or necrotic gummata cause a pathologic discharge.

(*b*) There is no pain either spontaneous or on touch.

(*c*) Luetic lesions are frequently at some distance from the external os, which hardly ever occurs in non-specific ulcerations of the cervix.

(*d*) Syphilitic ulcers are characterized by their sharp outline.

(*e*) Syphilitic ulcers are usually covered with a film-like deposit which may be wiped off easily and exhibits a characteristic fatty luster.

(*f*) Syphilitic ulcers show very little if any inflammatory reaction of the surrounding mucosa.

These common characteristics, however, may be invalidated to a lesser or greater degree by pregnancy, lacerations, co-existing inflammations, or local applications. Thus Méhanos speaks of the misleading fatty luster produced on erosions by the use of caustics.

In the diagnosis of the primary lesion the demonstration of the Spirocheta pallida is the prime requisite. Next in importance is the characteristic induration of the base if present. Wassermann is as yet negative. The appearance, in due time, of typical secondaries clinches the diagnosis.

The diagnosis of secondary ulcerations is based primarily upon the presence of the specific parasite. The positive outcome of the Wassermann reaction is a highly suggestive but not a conclusive aid in the diagnosis. The history of infection, coexisting secondary lesions in other parts of the body, and the prompt effect of specific treatment are contributory factors. Occasionally, exploratory excision and microscopic examination may be found necessary.

Tertiary lesions may so quickly develop from secondary ulcerations as in our Case VI, that differentiation between the two stages may not always be possible. Spirochetes are not found in the secretion. Wassermann may be negative, especially if the infection has occurred a long time previously. As a rule other tertiary manifestations are present. The actual findings and the immediate effect of specific treatment will establish the diagnosis. Microscopic examination is frequently a *conditio sine qua non.*

The differentiation of luetic from non-luetic affections of the cervix has been exhaustively considered by Delaunay and Darré, and particularly by Oppenheim. The following affections must be taken into consideration:

Erosion. The simple erosion is usually due to congestion or mild infection of the uterine or cervical mucosa and is, therefore, most frequently found in patients who complain of profuse vaginal discharge and of menorrhagias or metrorrhagias. It is always contiguous with the external os. It may occupy one or both lips or even surround the orifice, but hardly ever represents as regular and annular a shape as does the primary chancre. Its contour is indefinite in contradistinction to the well-defined outline of the luetic lesion. There is no change in the consistency or shape of the cervix.

The simple erosion runs a chronic course. The chancre heals rapidly. Spirilla may be recovered from the surface of an erosion or the vaginal discharge, but it requires only

little practice to distinguish these from Spirochetæ pallidæ by the ultramicroscope.

Soft Chancre. The differentiation between soft and hard chancre of the cervix is not always easy. Verchère (No. 115) and many writers before him resorted to inoculation of the suspected secretion into the skin of the abdomen. If an ulcer developed the diagnosis was made of a soft chancre. This diagnostic method is no longer acceptable as it does not decide the possibility of mixed infection. Dorsett (1891) reported 4 cases of cervical ulcerations which he considered the first authenticated instances of soft chancres. From the description given it seems probable that some of these ulcers were in reality of luetic origin.

The typical soft chancre of the vaginal portion represents a slightly depressed ulcer covered with a purulent deposit which may readily be wiped off. In contradistinction to the well-defined contour of syphilitic ulcers the edges of the soft chancre are irregular and notched and usually undermined. The base is granular and uneven, but never smooth as in the luetic lesion. An inflammatory reaction in the vicinity is always marked. Soft chancres are, as a rule, multiple. Their location frequently suggests their development by contact ("*Abklatschgeschwuere*"). Identical sores are often found on the external genitals. The secretion contains the bacillus of Ducrey. The regional lymph glands are always infected, and, according to Oppenheim, soft chancres may be discovered on the cervix as the true cause of an otherwise obscure suppuration of retroperitoneal glands.

Tuberculous ulcers are very irregular in shape. The edges are thinned out and deeply undermined. A grayish deposit covers the base. Small nodules, tubercles, are usually found in neighboring tissues. The most characteristic feature of all tuberculous ulcerations in the vagina is their marked tenderness to touch as contrasted with the indolence of luetic lesions. Search for tuberculous foci in other parts

of the body should be instituted and if necessary, microscopic examination of an excised piece made.

Gonorrheal Maculæ. Syphilis and gonorrhea are so frequently combined in the same individual that the differentiation of gonorrheal macules from macular syphilides is of great practical importance. Gonorrheal maculæ are less distinctly outlined, vary in size, often forming ill-defined confluent blotches. Their color is lighter than that of the syphilitic maculæ, appearing as a bright yellowish red. Usually they are lying flat in the level of the mucosa, but they may be elevated, especially when their surface becomes granular indicating the beginning of a transformation into a condyloma acuminatum. In this form the gonorrheal lesion resembles the luetic papule which, however, is well distinguished by its flat top.

Herpes genitalis is very rarely observed on the cervix. It manifests itself in the form of single or grouped minute vesicles with either clear or purulent contents. Each vesicle is surrounded by a bright red zone of inflammation. The vesicles are apt to form polycyclic figures. As a rule they soon rupture and change into superficial erosions which preserve a polycyclic arrangement. When infected they lead to the formation of aphthous ulcers.

Aphthous Ulcers. These have a smooth surface and are covered with a yellowish-white, adherent pseudomembrane. In this form they closely resemble small secondary ulcers or even small primary chancres. Oppenheim emphasizes as a distinguishing feature the firmness with which the covering film adheres, and the distinctness of the surrounding reactive zone in the mucosa.

Fibroid. Occasionally an intact gumma of the cervix may simulate a fibroid. (Zeissl, Lancereaux.) The observation of Montanier and Velpeau (No. 75) and the case of Mesnard mentioned above illustrate the diagnostic difficulty. Still more characteristic is our Case XIII where a nodule in the

cervix of a fibromatous uterus was recognized as a gumma only upon microscopic examination.

Carcinoma. The correct differentiation between syphilis and carcinoma of the cervix is by far the most important problem to be discussed here. Its great practical value can be seen from the fact that in the appended collection of case reports, a primary chancre was wrongly diagnosed as cancer in 6 cases, while in 21 instances of cervical gumma, the diagnosis of carcinoma was made in 14 cases (Nos. 25, 30, 31, 40, 41, 56, 59, 64, 77, 79, 86, 97, 104, 113, 132, 133, 134, 138, 140, 142). A study of these histories shows that chancre and particularly gumma of the cervix is more apt to be mistaken clinically for cancer than *vice versa.* In Wegscheider's case (No. 139) the patient instituted a damage suit against a dermatologist for having made the wrong diagnosis of syphilis. On the other hand, hysterectomies or amputations of the cervix have been done in cases where later developments demonstrated the presence of syphilis. In some instances the error in diagnosis was not recognized until the patient was on the operating table. Thibierge even goes so far as to say that many so-called cancers of the cervix which have been recorded as permanently cured by operation, have in all probability, been luetic lesions.

The similarity of the two affections is, indeed, striking if the lesion appears in the form of a cauliflower growth, as for instance in the case of Mollière (No. 74), Wile and Senear, and our own Case VI, or if a chancre is located within the external os, as described by Mrazek, and causes sloughing of the lowermost part of the cervical canal.

Shillitoe's suggestion that in syphilitic lesions we have to deal with young, in cancer with older women, cannot be accepted unreservedly.

Neumann believes that infiltration of the parametrium and immobilization of the cervix is common in cancer and rare in luetic ulcers, even in advanced necrotic gummata.

We cannot confirm the value of this differential point from our own experience (Case VI) and the study of the literature. It has frequently been stated that cancer bleeds easily as contrasted with luetic ulcers, and while this may be true in a general way, there are exceptions as, *e. g.*, the case of Wolter (No. 145) where hemorrhage and foul vaginal discharge were excessive. More helpful is the suggestion of McCann and of Sinclair that suspicious ulcerations upon the cervix which are separated from the external os by a zone of normal mucosa, are more likely to be of a luetic nature.

The final diagnosis, however, will depend upon the microscope, and even here pitfalls are possible as is so well illustrated in Wegscheider's observation (No. 138) where an authority of international reputation made the microscopic diagnosis of "carcinoma or sarcoma" in a case of cervical gumma.

A search for spirochetes should be made in every doubtful instance. Dark field examination is superior to other methods as it enables us to distinguish between the Spirocheta pallida on one hand and the Spirocheta refrigens and balanitidis on the other. The two last named are commonly found in the vagina and occasionally on necrotic cancers.

In daily practice the proposition amounts to this: The overwhelming majority of cancers presents itself in an inoperable state. If there be the slightest doubt as to the true nature of the disease, an attempt with antiluetic treatment should be made. We know that syphilitic lesions respond very promptly to appropriate treatment and, therefore, not much time would have been wasted even if specific therapy proved to be a failure. Spinelli's case (No. 109) and particularly O'Day's so vividly narrated experience (No. 83) carry a lesson which we would do well to accept.

Chapter VI

SYPHILIS OF THE UTERINE BODY

A. Primary Lesion. Chancre of the endometrium has never been observed. Theoretically, we must concede to Bab and Trinchese the possibility that the Spirocheta pallida may reach the endometrium and there enter the maternal tissues. This question has been discussed in some detail in Chapter II. We have, however, stated in Chapter III that the affinity of the parasite to squamous epithelium is so marked that chancres have hardly ever been observed on other epithelial surfaces.

B. Secondary Lesions. There is no conclusive evidence either of an anatomical or clinical nature to prove the involvement of the endometrium during the secondary stage of syphilis. Rille assumes that the endometrium is probably affected, and Franceschini declares that he agrees with Chiarleoni, Fasola, Spinelli, Morisani, and La Torre, who claim that secondary uterine lesions may produce leucorrhea, uterine neuralgia, and dysmenorrhea.

C. Tertiary Lesions. The list of contributors to the question of tertiary manifestations in the uterus is quite long, but only a very few authors are in a position to present definite facts. The problem may conveniently be discussed under the captions of myometrium and endometrium, while the question of luetic metrorrhagia will be dealt with in a separate chapter.

Myometrium. Bonnet (1886) and later Brioude (1896) describe as tertiary manifestation of syphilis the sclerotic condition of the myometrium in which both the connective tissue and muscular elements are hypertrophied and occasionally associated with endo- and periarteritis. Barthé-

lemy (1900) characterized metritis gummosa as follows: "On splitting the uterus one finds tumors located either interstitially, or beneath, and adherent to, the thickened peritoneum, or else beneath the mucosa. These tumors are hard and are neither as round and smooth nor as muscular or parenchymatous as fibroids. They are oval in shape, the size of large almonds, and surrounded by a thick fibrous capsule which sends out anastomosing processes into the surrounding tissues." The centre of these tumors consists of a yellowish tissue, resembling fat, which lies within an irregular network of fibrous bands.

Morisani (1902) has given us a very thorough description of the histologic findings (No. 78). The main feature is an atheromatous condition of the arteries, and the term angiosclerosis uteri is suggested as best expressing the condition of the uterus in tertiary lues. Morisani refers to analogous findings by Marchesi, and Pozzi and Latteux. Franceschini (1905) classifies tertiary lesions of the myometrium into different types according to definite clinical features, viz.:

(*a*) Period of syphilitic arteritis without appreciable change in form or size of the uterus. The only symptom available for the diagnosis at this stage is a free hemorrhage which yields to specific medication. "Tertiary syphilis being chiefly a disease of the bloodvessels, may cause an angiosclerosis strictly limited to the bloodvessels of the uterus."

(*b*) Sclerosis of myometrium, localized or general, leading to partial or general induration of the uterus which becomes as hard as wood.

(*c*) Enormous hypertrophy and induration of the uterus. The clinical symptoms are hemorrhage and pain due to congestion.

(*d*) Atrophy of the uterus, both of uterine wall and endometrium, the organ assuming the infantile shape. Metror-

rhagias continue as the predominant symptom but now appear alternatingly with leucorrhea, and are associated with pronounced general debility.

In a later paper (1909) Franceschini sums up all tertiary lesions of the uterus, including the cervix, and in this connection speaks of gumma of the uterine body. The uterine hypertrophy is due either to a diffuse gummatous infiltration of the parenchyma or is localized in fundus or cervix in the form of small nodules or small gummatous tumors of yellowish color. In the first case the uterus may become as large as a child's head, is hard, round, slightly nodular with disappearance of the vaginal fornices as the result of an edema extending to the vagina. This peculiar edema (already referred to in a preceding chapter dealing with the vagina) he considers pathognostic of tertiary lues of the uterus.

The classification of Franceschini has, without change, been adopted by Goldenstein (1908) and then again appears in the paper of Jaworski (1911). From this latter contribution it has been copied by practically all recent writers.

Laffont (1908) has slightly simplified but not changed this outline by dividing the tertiary uterine lesions into two groups: (*a*) gummatous lesions, appearing either as diffuse infiltrations or in the form of nodules; and (*b*) sclerotic conditions which either affect solely the uterine vessels, or the uterine wall, in the latter form being total or partial, atrophic or hypertrophic.

Obviously influenced by the dogmatic assertions of Franceschini and Laffont, modern writers often speak of the gummatous or sclerotic syphilitic uterus as an established fact.

Yet Laffont's own observations, as can be seen in his extensive monograph, were limited to a single case, that of a syphilitic woman (No. 51) who suffered from metrorrhagias. He describes her uterus as slightly enlarged and bases his diagnosis of tertiary syphilis of the uterus on the fact that

three weeks after the beginning of mercurial treatment the hemorrhages ceased.

We present in the histories Nos. 29, 30, 31 and 32 the only personal observations published by Franceschini. In two cases (Nos. 30 and 32) the uterus is mentioned as enlarged and hard, in both instances a cervical carcinoma was discovered a year later. It is possible that his far-reaching deductions are based on many more observations which he has failed, however, to mention explicitly in any of his papers. It seems more probable that he, too, has accepted much as proved that had been said by earlier writers.

In a much-quoted case of Lebert, published probably in 1851 (a bibliographic reference is not given by a single author) the uterus on cross-section showed small yellowish nodules "composed of the same tissues as are found in the gummata of the heart." A detailed description of the case of Montanier is given in history No. 75. While in this case the nodular enlargement of the uterus may possibly have been due to gummata, not enough proof is furnished to permit a serious consideration of this case in a scientific discussion of the question of tertiary lesions of the uterus. Morgan's observation (No. 77) is admitted by Laffont as a good example of gummatous uterus. Robineau in one patient (No. 99) finds the uterus enlarged and hard, at first suggesting the presence of fibroids, and in another case (No. 100) describes the uterus as enlarged to the size of a fist, irregular in outline accompanied by a hard infiltration of both broad ligaments. In these two cases the diagnosis of tertiary syphilis of the uterus is solely based on the fact that specific treatment was followed by improvement of the symptoms, in the first case also by a reduction in the size of the uterus.

To these quotations we can add only the reference, already mentioned, made by Barthélemy concerning small yellowish nodules in the uterine wall.

This apparently represents most if not all the clinical and pathological data available for the study of a gummatous process in the uterine wall, not enough, in our opinion, on which to base the pathology of this condition or to attempt a classification of its various types.

There is an even greater paucity of facts concerning the "characteristic sclerosis" of the myometrium. Some of these "slightly enlarged and hard" uteri have been removed to relieve obstinate hemorrhages. The two cases most often quoted are included in our collection of histories. Letulle (No. 60) finds a typical endophlebitis in the veins of the submucosa, Morisani (No. 78) an endarteritis. In all other instances, of which our collection of cases contains a number of typical examples, the diagnosis is based solely on the beneficial effect of antiluetic treatment on irregular hemorrhages. This diagnosis *ex juvantibus*, which plays so important a role in the literature of tertiary syphilis of the uterus, is, we believe, often misleading. This point will be taken up in detail in Chapter X.

Endometrium. A critical consideration of the literature on syphilitic endometritis reveals a situation not very different from that exposed in the foregoing pages.

Chase's statement that syphilitic endometritis is the commonest form of uterine syphilis is balanced by Doederlein's admission of the extreme scantiness of our knowledge concerning this form of endometritis. The prevailing confusion is well illustrated by another assertion by Chase: "An extensive syphilitic endometrial infection is believed by many authorities to be the cause of so-called membranaceous dysmenorrhea." The actual facts, as far as we have been able to ascertain after a most careful search of the literature, are as follows: In 1878, Wyder, then a medical student, described a case of dysmenorrhea in a woman who never before had suffered from dysmenorrhea. This patient, on two successive menstruations, expelled shreds of tissue

with considerable pain. As a miscarriage could be excluded, Wyder thought of a possible connection between the dysmenorrhea and the fact that the patient's husband had had syphilis. Therefore the husband (not the patient) received antiluetic treatment and from then on menstruation again appeared without pain. The author concludes that syphilitic virus from the husband had caused in the patient an "endometritic affection (endometritis hyperplastica)," which would explain the dysmenorrhea. Upon this slender thread hangs the "endometritis exfoliativa (Wyder)," which today is mentioned in every contribution to the question of syphilis of the internal genitalia. We quote this instance *in extenso* merely as one of many examples in literature studied by us, in which a debatable assumption through continuous copying had developed into a "very important fact."

Neumann (1896) acknowledges that endometritis is commonly seen in women with syphilis, but that it is difficult, if not impossible, to establish an etiological relation between these two conditions. An existing endometritis, however, becomes aggravated by a luetic infection, the secretions become more profuse and are often followed by menorrhagia which finally is cured only by specific treatment. He thinks that a very thin cervical discharge is particularly suggestive of this condition. Aievoli (No. 1) based his diagnosis of syphilitic endometritis on the observation that a uterine catarrh which had resisted the usual treatment finally disappeared when the local treatment was combined with specific medication. Gelli (1896) does not doubt the existence of a fungoid syphilitic endometritis and quotes as example an observation made on a woman aged fifty-four years (No. 38). Boldt (1899) in a case of metrorrhagia cured by specific treatment describes the uterus as soft and the endometrium as giving the sensation "of a wet sponge." Wells, in discussing this case, expresses his belief in the existence of a syphilitic endometritis in which condition the

endometrium is very soft. Muratow (1907) suggests that uterine hemorrhages may be due to syphilitic ulcers in the endometrium, just as, *e. g.*, hematemesis is caused by erosions in the gastric mucosa.

Recasens made a valuable contribution in 1911. In one of his cases of metrorrhagia the uterus was extirpated for assumed cancer. Instead, a fungous hyperplastic endometritis with several small scars was found, the latter, in his belief, representing healed ulcers. The vessels showed an extensive peri- and endarteritis which in certain places had led to complete obliteration of the lumina of the vessels.

These scars and vascular changes are remarkable in view of the fact that in most cases of apparently uncontrollable metrorrhagia of obscure origin the endometrium has been found normal if not atrophic. Spinelli's case (No. 111) illustrates this point.

Again it is Franceschini who describes in detail the endometrium of the tertiary luetic uterus. The inner surface of the uterus is more or less ulcerated. The mucosa shows vegetations with irregular deep furrows. These fungosities secrete a serous or purulent discharge and occasionally cause bleeding. Curettage removes a large amount of endometrium. The mucosa in these cases contains large areas of degeneration and necrosis with round-cell infiltration which extends into the uterine wall.

The only well-authenticated case of gummatous endometritis on record has been published by Hoffmann (No. 40). In this case a layer of gummatous tissue was found, several centimeters in thickness, which substituted the endometrium throughout its entire extent.

The relationship between syphilitic endometritis and uterine hemorrhages will be discussed in Chapter X.

We have already referred to the claim made by Shaw-Mackenzie, but denied by Winckel, that in syphilitic women the pregnant uterus shows a tendency to rupture. Meyer quotes an observation of Zweifel pertaining to a woman who

had been delivered of four macerated fetuses. In the fifth pregnancy the uterus suddenly ruptured during a severe vomiting spell. Zweifel suspects that syphilis may be responsible for this occurrence, which opinion he had found confirmed by similar observations in the course of years.

Weber adheres to the same theory and places the abnormal frailty of the uterus in the absence of any tangible changes in the uterine wall, in analogy to similar conditions in the course of pronounced cachexia, chronic intoxications, wasting diseases. Freund is rather positive in ascribing to syphilitic changes in the myometrium the cases of uterine rupture reported by Schmauss, Zweifel, and Crossen, the latter having found "fatty degeneration of muscle fibers and arteriosclerosis." How hastily conclusions are drawn occasionally is well illustrated by the case of Bosse (No. 14). A heredosyphilitic had severe hemorrhages three weeks postpartum. Curettage was decided upon for suspected syncytioma. After dilatation of the uterus, digital exploration revealed a large hole in the fundus which the author assumes to have occurred during labor as a result of syphilis. We encounter this case in all recent publications as an unimpeachable instance of syphilitic metrorrhagia but we may leave to the critical reader the decision as to the validity of the diagnosis. It is significant that Baisch, in a recent and very exhaustive study of the etiology of uterine rupture, does not even mention the word syphilis.

Spirochetes have been found in the uterus as in most other organs of the congenitally luetic fetus by Bab, Graefenberg and numerous others, but conditions in hereditary and acquired syphilis differ too widely to permit of any definite conclusions. All attempts at finding spirochetes in extirpated uteri of syphilitic women have thus far failed. On the other hand we shall show in Chapter XI that the cervical discharge in rare instances contains the specific parasite, and future researches may yet acquaint us with definite luetic alterations of the endometrium.

SUMMARY

Our actual knowledge concerning syphilitic lesions of the uterine body is extremely meager. Primary and secondary manifestations have not yet been observed in the uterus. A few instances of gumma in the uterine wall have been recorded. An isolated observation by Hoffmann proves the possibility of gummatous changes in the endometrium. This infrequency of tertiary lesions is a matter of surprise, for the uterus more than any other internal organ of the body is exposed to direct infection. Spirochetæ may reach the uterine cavity from the vagina or lesions of the cervix. Older writers have pointed out that in pregnancy the uterus is exposed to infection from the fetus which owed its syphilis to the father. In the light of modern knowledge, however, the disease is transmitted, in practically every instance, to the fetus from the mother even though at the time syphilis may be latent in the latter. Leaving the question of paternal and maternal infection aside it is certain that an actively syphilitic mother invariably infects the fetus. The logical conclusion is this that in every pregnant syphilitic woman spirochetes must be present in the maternal portion of the placenta, *i. e.*, the endometrium. The findings by Huebschmann of spirochetes in the decidua prove the point made. Unless syphilitic lesions of the uterus have been overlooked in the past, as Whitehouse suggests, we are forced to assume a relative immunity on the part of the uterus. "It is a very striking fact," says Pusey, "in view of their being purely genital structures, that the

body of the uterus and its analogue in the male, the prostate, are probably the most rarely involved of any structures in the body affected by tertiary syphilis."

Chapter VII

SYPHILIS OF THE TUBES

In the histories Nos. 2, 12, 15, 20, 22, 23, 33, 40, 48, 94, 96, 132 to 136, and 141 we present all the reports of syphilitic changes of the Fallopian tubes existing in medical literature.

There are 3 cases which apparently are looked upon by most writers as unimpeachable evidences of luetic processes in the tubes. The oldest case (No. 15), reported in 1866 by Bouchard and Lépine, is supposed to present the best example of tubal gumma on record. Three small nodules were found in each tube. A description of the microscopic findings furnished by the authors does not mention any of the features which today are generally accepted as typical of gumma. Doenhoff (1888) gives a detailed account of the appearance of the tubes found in a heredosyphilitic newborn (No. 22). According to Martin, this is a most important observation, since "obviously in this case any other cause for the tubal anomaly can be excluded." In the light of our present knowledge this assumption is open to discussion, and therefore one is not surprised to find a very different pathology in the third case which is also constantly quoted, namely, the description given by Ballantyne and Williams (No. 2) of the tubes of a luetic fetus of seven months.

A group of cases is next to be considered in which the diagnosis of tubal syphilis has been made tentatively or, on the other hand, quite positively merely because a mass outside of the uterus, presumed to be a gumma of the tube, or a palpably thickened tube had diminished in size or

entirely disappeared after specific treatment. More definite pathologico-anatomical data are required to support the diagnosis of syphilis unless we accept the beneficial effect of treatment as the sole criterium. But if, as in the cases of Dalché (No. 20), Whitesead (No. 141), and Pollaillon (No. 96) an improvement was noticed only after two, two and a half, and three months respectively, is one not justified in citing the old *post hoc* but not *propter hoc?* The cases of Jeanne (No. 48) and of Fuller (No. 38) which have been admitted as doubtful by the authors themselves, can not withstand critical scrutiny. In Pinard's case (No. 94), in which a peri-uterine tumor of obscure origin disappeared under specific treatment, the diagnosis of tubal syphilis is based largely upon a peculiar edematous softening of the vaginal walls (*empâtement*) which in the author's opinion is pathognostic of tertiary genital lesions. Boldt's (No. 12) report reflects a view prevailing at one time but no longer accepted. In the case of Hoffmann (No. 40), quoted repeatedly in the foregoing pages, the whole genital tract was involved in a generalized gummatous process affecting the entire pelvic cavity—an observation unique rather than typical. There remain then only the five cases of Wassilieff (No. 132 to 136), all five recording different pathologic lesions in tubes diagnosed as syphilitic. We shall discuss in detail these five cases, but may say in this connection that Pichevin in a thorough and critical review of the literature does not conceal his skeptical attitude toward the observations of Wassilieff.

In summarizing the entire material available for a critical consideration of the question of the involvement of the tubes in the course of syphilitic infection we have to admit that it is limited to two observations on fetuses, the specimens of Bouchard and Lépine, Doléris (No. 23), and Wassilieff, and to six clinical observations.

Findings in fetuses are of no consequence in the study of

the pathology of the tubes in the adult. The description given by Doléris is too meager, and even the case of Bouchard and Lépine is lacking in certain essential features to be admitted as positive evidence of a tubal gumma.

Thus our present knowledge concerning the pathology and symptomatology of the syphilitic tube is reduced to the information given in the article of Wassilieff who bases his deductions exclusively on his own observations, since he questions the validity of all previous reports of tubal syphilis.

Wassilieff claims that syphilitic salpingitis occurs in two forms. In the first stage of the affection the tube is congested, slightly enlarged, not exceeding the size of a finger, and of a characteristic indigo blue color. Later the tube becomes thinner, about the size of a lead pencil, white in color, distinctly harder, sclerosed. Microscopically this second stage is recognized by a displacement of the muscle fibers in the tubal wall with connective tissue and by the typical signs of periarteritis and periphlebitis.

The process is associated with intermittent or continuous pain and characterized by irregular uterine hemorrhages or persistent metrorrhagias. As most characteristic, he pronounced pain, elicited by pressure along the course of the femoral, epigastric, uterine, and vaginal arteries and their branches, a point also mentioned in the reports of Jaworsky (No. 45) and Muratow (No. 80). Wassilieff asserts that the differential diagnosis from other tubal processes can be easily made by the absence of peritoneal symptoms, the peculiar shape and consistency of the tubes, especially in the sclerosed stage, and by the peculiar sensitiveness of the pelvic arteries.

The diagnosis is confirmed by prompt improvement of the condition after specific treatment. He adds, however, that in the case of sclerosed tubes no reduction in the size of the organ can be expected from medication.

A careful study of the five cases of Wassilieff (given *in extenso* in the appended collection of histories No. 132 to 136) will show that a diagnosis of syphilis in the first two patients is somewhat doubtful.

In none of the cases histologic findings are recorded which would indicate the luetic nature of the tubal changes. Nevertheless we find Laffont, who had no personal experience with syphilitic tubes describe "at least six forms of tubal syphilis" (*a*) congestive type, usually found in the secondary stage of the disease; (*b*) catarrhal type, analogous to the syphilitic coryza, often heredosyphilitic. Into this group he counts the blue tubes of Wassilieff which later become white and atrophic, also the fetal tubes described by Doenhoff; (*c*) gummata (Bouchard and Lépine, Fuller, and Whitesead); (*d*) sclerogummatous tubes, more common than gummatous; (*e*) sclerotic type, usually symmetric in both tubes (Doléris); and (*f*) sclerocystic type, the most frequent type, anatomically characterized by multiple cysts, varying in dimensions, some with purulent, others with serous or hemorrhagic contents. This form is usually associated with ovarian lesions (*lésions ulcéreuses des ovaires*).

It may seem superfluous to quote at such length Laffont, who has built up a beautiful but somewhat imaginary system of tubal syphilitis on the basis of the scant material which we have collected in this chapter and for the greater part have found wanting, were it not for the fact that his classification has already crept into some of the more recent publications.

Without wishing to detract from the value of Wassilieff's observations it seems strange that in the eleven years which have elapsed since his publication, not a single confirming specimen has been obtained among the tens of thousands of tubes which have been removed. Only once did we encounter during a laparotomy on a luetic woman

a congested tube which, by its color, suggested the indigo blue stage of Wassilieff's classification, but the microscopic picture differed in nowise from that of any chronic salpingitis.

SUMMARY

It seems possible that the tubes may be the seat of luetic lesions, but the pathological and clinical material on record is yet too incomplete to permit of positive assertions. Spirochetes have never been found in the tubes of syphilitic women.

Chapter VIII

SYPHILIS OF THE OVARIES

In his *Traité de la Syphilis*, published in 1864, Lancereaux devotes several pages to a discussion of syphilis of the ovaries. A study of the literature of the past fifty years clearly shows that the pathology and symptomatology of ovarian syphilis as described by the most recent writers is but a slightly modified version of the views of Lancereaux. We, therefore, feel justified in beginning this chapter with an extensive quotation from this work.

"Astruc speaks of tophus, scirrhus, and of ovarian tumors representing syphilitic lesions, but what he says on this subject is so vague and influenced by the theories of his day as to be unworthy of much attention. After Astruc, Richet is, perhaps, the only author who mentions these changes. Speaking of breast tumors due to syphilitic diathesis, he mentions that they seem to be analogous to tumors seen by him in the ovaries of such patients. In a thesis presented to the faculty of Paris in 1858 the following passage occurs: Before the Anatomic Society, in 1858, the

case of a girl of twelve years was mentioned, who presented gummy tumors of both ovaries, recognized as such by the aid of the microscope. But this short note leaves at least room for doubt concerning the nature of the changes in the ovaries. The syphilitic ovarian lesions which I have seen personally most closely resemble those of the testicles. The diffuse form, or syphilitic ovaritis, I have seen only in the atrophic state, but it bears so close an analogy to syphilitic orchitis that we may fairly assume that it follows the same evolution, viz., in the beginning there is a proliferation of the connective-tissue elements and a corresponding increase in the size of the organ. Later a fibrous thickening and induration develops which, by degrees, changes into contraction and atrophy. Such an evolution is suggested by several of our cases, where in women not yet at the age of the menopause the ovaries were found of normal size or even smaller, but entirely fibrous, sometimes covered with scars, and no longer containing Graaffian follicles. The gummy form of ovarian syphilis presents the closest analogy to gummy orchitis. The enlarged ovary contains a soft, dry, yellowish mass."

Lancereaux proceeds to quote the case of Lécorché (No. 59) as an example of ovarian gumma, and presents the histories of two personal observations (Nos. 53 and 54) in support of his own views concerning "syphilitic ovaritis." We have added in our collection a third history (No. 55) found in his work. Although he himself makes no claim in this last case concerning any connection between the small size of the ovaries and the assumed congenital lues of the woman in whom they were found, yet this case has been quoted by various writers as a positive instance of ovarian syphilis.

Virchow (1864) writes: "There is very little known concerning syphilitic affections of the ovaries. From my own experience I do not doubt that an oöphoritis syphilitica

exists, but I can not say that this process ever leads to anything else but a fibrous induration of the tissues and its sequelæ."

Another pathologist, Baumgarten (1884), in describing a case of tuberculosis in an ovarian cystoma, discusses the differential diagnosis from ovarian gumma. He states in this connection: "Ovarian syphilis in the form of nodular gummata, as far as I know, does not exist."

Two observations of Hennig have repeatedly been quoted, among others, by Orthmann. These have never been published, but only briefly mentioned in the course of a discussion. Hennig, in two syphilitic women, ascertained a distinct enlargement of the ovaries. In the one case it was found at autopsy that the enlargement was due to an edema; furthermore, eroded areas were seen on the surface of both ovaries. In the other case the ovaries became smaller after specific treatment. Graefenberg, who also mentions these two cases, challenges their value in the question of ovarian syphilis.

There are in literature only three other records of tumefactions in ovaries presumably due to a syphilitic infection (Nos. 40, 73, and 104). The first case is the unique observation of Hoffmann, in which an extensive gummatous process also involved the ovaries. This case has repeatedly been mentioned in our paper. The next case, reported by Meslay, does not contain the slightest proof that the diffuse mass, which later disappeared under specific treatment, actually was a gumma, and, indeed, Pothérat, in discussing this case, expresses the belief that more probably it was an inflammatory mass, a phlegmon of the broad ligament. The last case (No. 104) recorded by Schaeffer suggests the possibility of ovarian gumma, but the author himself is cautious in his assertions.

We must, therefore, agree with Meyer, who as late as 1913 stated that literature does not contain a single well-authenticated record of gumma formation in the ovary.

Modern literature concerning manifestations of syphilis in the ovaries other than gumma begins with Ozenne (1898) (Nos. 85 and 86). In a paper read before the Gynecologic Congress in Rouen (1904) he differentiates between two forms of syphilitic ovaries, the hypertrophic (sclerotic) and the atrophic, the latter being simple or cystic. Franceschini (1909), quoting Ozenne, speaks of a secondary manifestation of ovarian syphilis, appearing within a month after the infection, which affects only one ovary and is occasionally accompanied by fever. In his opinion this secondary luetic oöphoritis occurs rather frequently, is usually not recognized, but explains obscure cases of leucorrhea and dysmenorrhea. It is distinctly different from a sclerotic form of luetic ovary which is seen only in the tertiary stage when it causes metrorrhagias.

The most extensive description of the pathology of syphilitic oöphoritis is presented by Dalché and Fouquet: Syphilis affects the ovaries either alone or together with the uterus and tubes. In the latter case the ovarian lesion dominates the clinical picture, a fact in harmony with the relative prominence of ovarian function. The ovary at first becomes congested, it is found enlarged and red in color. Repeated congestions of this sort finally lead to typical alterations in the vessels. Specific arteritis ends in complete angiosclerosis which finally may find its expression in ovarian hemorrhages (a theory accepted by Oehmann). The resulting irritation leads first to disseminated sclerosis and finally to a total sclerosis, manifesting itself in the form of amenorrhea and sterility. A thickening of the tunica albuginea causes the formation of retention cysts and the writers, in this connection, state their belief that many of the cystic ovaries found during operations owe their existence to syphilis. Gummata may form in the neighborhood of obliterated vessels and are usually combined with sclerotic changes, thus giving rise to the "sclerogummatous syphilitic ovary,"

which may rupture and lead to the formation of peritoneal adhesions.

It is impossible to determine just how far these views of Dalché and Fouquet are based on anatomical material obtained at operation or autopsy, and how much they have been influenced by the writings of preceding authors. Dalché and Fouquet are quite in harmony with Franceschini's views and accept his comparison between the syphilitic lesions of ovary and testicle. Franceschini again quotes Ozenne as his authority, and if we go fifty years back we find that this teaching originated from a mere assumption by Lancereaux.

The evidence brought before us is too meager to be accepted as conclusive. In not a single instance has a microscopic examination been made. In Ozenne's case (No. 85) bilateral oöphorectomy was performed, and solid tumors, the size of small eggs, "arising from sclerotic ovaries," were removed. On section these tumors were hard and seemed to consist of fibrous tissue, but the histologic examination is lacking. The existence of syphilitic oöphoritis is as yet far from being proved. Spirochetes have been found in the ovaries of luetic fetuses, and even in the ovum itself, by Hoffmann and Wolters, Bab, Levaditi and Sauvage, McIntosh and others, but never in the ovaries of adult women. Comparisons between the fetal and adult ovary are not permissible, and the contention of Ozenne and his followers that the "sclero-cystic ovary" represents a typical tertiary lesion seems to us as questionable as it did to Pichevin.

In a number of instances the luetic character of an ovarian enlargement has been deduced from its reduction in size after specific treatment had been instituted. This naturally leaves out sclerotic or sclerocystic ovaries which are supposed to represent the most common type, and can apply only to cases of acute swelling in the earlier stages of the disease (Franceschini). The difficulty, however, to exclude,

in a given case, physiologic fluctuations in the size of the ovaries, or the influence of other factors, gonorrhea for instance, seems almost insurmountable. Equally the symptom of pain can not be relied upon in the diagnosis unless it occurs only at night, when it would more likely betray its specific origin.

Lancereaux, Dalché, Klebs, Kurz and others consider amenorrhea and sterility a natural and common sequel to luetic infection which, by a total sclerosis of the ovary, destroys the Graaffian follicles.

If this were true the problem of hereditary syphilis would not need to engross the interest of the medical world. The fact remains, however, that amenorrhea is frequently noticed in the course of syphilis, and only the assumed relationship between amenorrhea and syphilis of the ovary requires a brief discussion. Three cases of Meirowsky and Frankenstein (Nos. 70, 72, 71) and nine observations made by Wagon (Nos. 123 to 131) may be consulted in the collection of case reports. In our own material we have been impressed by the frequency of amenorrhea and select for illustration the following

PERSONAL OBSERVATION XIV

I. C. (Adm. No. 12452–15), colored, aged thirty years. Entered hospital December 27, 1915. Menstruation first when fifteen, always regular, lasting five days, profuse, no pain. Has never conceived. Denies sexual relations prior to marriage four years ago. Treated in this hospital for "sore" in vagina a short time after marriage. Had an eruption over entire body three years ago. *Since then amenorrhea.* Present complaints: fast heart action, swollen feet, sore throat, unable to eat, headaches, hot flushes, paresthesias. Patient appears very sick; is emaciated, anemic, and dyspneic. Large scars of old syphilitic lesions scattered all over body. Ulcer on right leg. Generalized adenopathy; cervical and epitrochlear glands particularly large.

Diagnosis of visiting internist: Syphilitic myocarditis and pharyngitis.

January 1, 1916. After four days of mixed treatment patient is much improved. Throat less sore. Patient now able to eat some solid food. Gynecologic examination: Vulva and vagina present senile conditions. Uterus in retroversion, very small. Cervix atrophic; anterior lip not palpable. Adnexa not palpable.

Diagnosis: syphilitic amenorrhea.

Do these cases of amenorrhea prove the existence of a specific lesion of the ovary with destruction of the Graaffian follicles? In the light of our modern conceptions, amenorrhea expresses cessation of ovulation, and ovulation may be suspended temporarily, and only very seldom permanently, by any marked weakening influence upon the general system. Thus typhoid, diabetes, hyperthyroidism, obesity may cause amenorrhea. Just as in pulmonary tuberculosis, amenorrhea is common without a local tuberculous process in the ovaries, so may syphilis prevent ovulation by its effect upon the general health which, as we have mentioned in Chapter II, is more deeply affected in women than in men. This explanation is in full harmony with the general experience that menstruation reappears after specific treatment as the general health improves. The phenomenon of amenorrhea can not be adduced as proof of the existence of luetic lesions in the ovary.

The question of metrorrhagia as the expression of ovarian syphilis will be dealt with in a later chapter.

SUMMARY

Various changes in the ovaries (simple enlargement, syphilitic oöphoritis, tertiary sclerosis of ovary, ovarian gumma) have been described as typical expressions of the secondary and tertiary stages of luetic infection, but in no instance (with the possible exception of Hoffmann's case) has

positive proof been furnished that such alterations are actually due to a local luetic process.

The fact that in some syphilitic patients either an amenorrhea or, more commonly, a metrorrhagia disappears after specific medication can not be accepted as evidence of a syphilitic ovarian lesion. Spirochetes have as yet not been demonstrated in the ovaries of adults.

Chapter IX

SYPHILIS OF THE PELVIC CELLULAR TISSUE

Theoretically, primary or secondary lesions of the pelvic connective tissue and its peritoneal covering would seem possible from the infectiousness of syphilitic sperma and the motility and penetrating power of the Spirocheta pallida. As a matter of fact, however, only the tertiary form of syphilis has been observed in the cellular tissue of the pelvis. There are so few cases of pelvic gumma on record that no estimate of its relative frequency can be made. Bernutz (as quoted by Neumann) in an analysis of 99 cases of pelvic peritonitis believes that two of these had their origin in syphilitic lesions of the cervix, but he adds that tertiary ulcerations of the rectum are more apt to extend to the pelvic peritoneum. The affection is essentially a gummatous infiltration of the cellular tissue associated with the formation of peritoneal pseudomembranes and adhesions. The posterior cul-de-sac may contain a free or encapsulated serous exudate with small fibrinous flakes. Ordinarily the pelvic cavity is filled with a mass which involves the intrapelvic structures and effaces all anatomical landmarks.

A very similar description of pelvic gumma is given by Barthélemy.

The diagnosis of this affection is extremely difficult; in fact, in almost every instance has the condition at first been diagnosed as a malignant process. On account of its great practical importance we have felt justified in including in the collection of case reports three observations made on male patients.

Fournier (No. 28) discovered in the pelvis of a man a diffuse mass, apparently involving bladder and rectum. Three other prominent physicians confirmed the diagnosis of a malignant process. There was no history and no evidence of an acquired syphilitic infection; certain features, however, suggested the possibility of hereditary lues. Specific treatment was followed by complete cure. It was this observation which induced Loeb (No. 65) to record similar findings made in a man with acquired syphilis. The diagnosis was osteosarcoma of the pelvis. At autopsy, gummata were found in the liver and other organs, and the writer concluded from this that the pelvic mass, too, represented a gummatous process. A similar case has been reported by Mouchet and Nicolaidi (No. 79). A man had a large hard pelvic mass suggestive of a cancerous growth which disappeared under specific treatment. In this case the infection presumably was hereditary. Reed (No. 98) in his text-book *Diseases of Women*, merely states that he has removed a gumma the size of a man's fist from the broad ligament. The case detailed by Lancereaux (No. 56) is very instructive. A hard mass in the pelvis of a woman was diagnosed carcinoma. The case was obviously inoperable, and although there was no history of syphilis an experiment was made with potassium iodide. Much to Lancereaux's surprise the tumor disappeared and the patient was restored to perfect health within two months. Osler and Churchman refer to the publication by Herxheimer of a case in which a pelvic gumma between bladder and rectum had erroneously been

diagnosed as carcinoma. We have been unable to locate the original report.

The following case represents a typical pelvic gumma:

PERSONAL OBSERVATION XV

J. L. (Adm. No. 4048–15), colored, twenty-eight years old. Menstruation first at fifteen and a half; regular; lasting three days, small amount; very little pain. In past two years menses occur at two, three, and four months' intervals, lasting from one to one and a half days, without pain, very scant and pale; last menstruation several months ago. No miscarriage. One normal confinement ten years ago; child alive and well. Unable to state time of infection.

Vaginal discharge for last three months very profuse, at first thick and yellow, then watery, now tinged with blood. Suffering for past month with pain in right lower quadrant of abdomen; also swelling of vulva and of right leg.

June 27, 1915. Examination: Marked cachexia. Wassermann + + + +. Skin of abdomen wrinkled. Abdominal walls thin; gaseous distention. Entire mons Veneris edematous. Left femoral glands enlarged, indolent. Right inguinal glands not palpable in the edematous tissues. In right inguinocrural fold there are two oblong ulcerations parallel to one another, each about one and a half inches in length. On pressure over mons Veneris a large amount of thin, yellowish-greenish, not offensive pus exudes from the median ulcer. Both ulcerations covered with necrotic, sloughing tissue; both painful to touch. The right inguinal region is occupied by a hard mass which rises from the pelvic and extends upward one finger's breadth above Poupart's ligament; pressure above this mass at the level of the anterior superior spine is painful without any palpatory findings.

Clitoris and prepuce edematous, forming a tumor the size of a cherry. Both labia majora and minora swollen, the right ones more so than the left. Greenish pus oozes from the vulvar opening which is occluded by the swollen labia. On separating the latter a shallow ulceration is found on the inside of the right labium minus. The ulcer has the size of a five-cent piece, is tender on touch, with sharp, somewhat serpiginous edges and an irregular base which is covered with fresh granulations. There is no secretion and only a slight induration.

The edges of the urethral orifice are edematous. By digital examination the entire urethral tube feels indurated to about three times its normal size. Vagina long. Cervix normal shape and normal position. In the right upper half of the anterior vaginal wall there is an infiltration of stony consistency which blends with the urethra. This infiltration, which extends laterally to the pelvic wall, is contiguous with the suprapubic mass described above. It is immovable, poorly defined, not tender, apparently flat, disk-like. The uterus can not be palpated as such; it seems to form part of the induration. No fever. No hyperleukocytosis.

Diagnosis: An inflammatory lesion can be excluded. The chronicity of the affection together with the positive result of Wassermann and the characteristic aspect of the swelling of the external genitalia lead to the diagnosis: gummous infiltration of the pelvic cellular tissue.

July 13. Salvarsan 0.6 intravenously; also daily inunctions of mercury and potassium iodide internally.

July 16. Subjective improvement immediate. Objectively the edema of mons Veneris has disappeared and the purulent secretion from the ulcer in the right groin is perceptibly reduced. Swelling of the vulva practically disappeared; in particular, clitoris and prepuce have again assumed normal proportions.

July 31. Ulcers in right groin more shallow and tenderness almost absent. Tumor mass only half its former size, no longer palpable from above. Patient no longer cachectic.

August 2. Patient insists on leaving hospital.

The foregoing case illustrates clearly the wide extent of gummatous infiltration of the pelvic cellular tissue. The process had started in the right half of the pelvis, extended downward into the vesicovaginal septum, forward into the cavum Retzii and the tissues of the mons Veneris, and laterally beyond the left edge of the uterus, so that the latter formed an indistinguishable part of the whole. The absence of fever and hyperleukocytosis permitted the exclusion of a parametric exudate; the youth of the patient argued to a certain extent against the assumption of malignancy; while the result of the Wassermann test and the

familiar aspect of the syphilitic alterations of the vulva, the stony hardness of the mass, and the absence of pain on pressure indicated syphilis. The tenderness above the tumor could well be explained by a secondary irritation of the peritoneum such as described by Bernutz and Barthélemy. The immediate result of specific treatment confirmed our diagnosis. It was unfortunate that the patient insisted on leaving the hospital as soon as she felt improved. We have tried in this as in other cases to trace her through our Social Service Department but have not been successful. All those who are in charge of negro wards know how hard it is to keep these patients in the hospital, once they feel a little better.

A less extensive involvement of the pelvic connective tissue was present in our Cases VI and X. In both cases, there was a gumma of the cervix, and the parametria showed an infiltration very similar to that seen in carcinoma, which immobilized the cervix.

SUMMARY

Syphilis of the pelvic cellular tissue appears in the form of a diffuse gummatous infiltration which secondarily involves the pelvic peritoneum. To the few cases on record a personal observation has been added. In almost all instances a wrong diagnosis of malignancy has been made. In our own case the positive outcome of the Wassermann reaction together with other unmistakable signs of tertiary syphilis about the outer genitals aided in arriving at the correct diagnosis. Specific treatment produces amazingly quick improvement of an apparently hopeless condition.

Chapter X

SYPHILIS AND METRORRHAGIA

A glance through the appended collection of 147 cases of syphilis of the internal genitals shows that uterine hemorrhage is mentioned as the predominant symptom in 57. It is usually regarded as the manifestation of a syphilitic lesion of the uterus, in rarer instances that of luetic affections of the tubes or ovaries.

The following questions suggest themselves.

(1) Is there any causal relationship between syphilis and uterine hemorrhage?

(2) Does uterine hemorrhage in a syphilitic subject denote the presence of a syphilitic lesion in the uterus?

(3) Does such a hemorrhage signify a local luetic affection of the uterine appendages?

Syphilitic hemorrhages are generally characterized as beginning in the form of menorrhagias which gradually change into metrorrhagias and prove refractory to the customary modes of treatment. *Cessation of bleeding under specific therapy clinches the diagnosis.*

There is a flaw in this way of reasoning. Diagnosis *ex juvantibus*, once so popular in medicine, is gradually being eliminated by newer and more precise methods of diagnosis. In the case of syphilis these modern methods are the demonstration of the Spirocheta pallida and the Wassermann reaction. While the fact is definitely established that the customary antisyphilitic therapy has a decisive effect on certain luetic lesions or symptoms, yet it must be borne in mind that salvarsan, mercury, and potassium iodide may be employed successfully also in other non-specific conditions. We refer, parenthetically, only to the recent successes with neosalvarsan in the treatment of gonorrhea reported by Stuehmer, Henck, Janet and Lévy-Bing. It is, therefore, too

sweeping a statement to say that an etiologically obscure lesion or symptom must needs be syphilitic because it yielded to antisyphilitic treatment.

How does all this apply to metrorrhagia? Let us first consider briefly the changes in our views within the last five or six decades concerning the etiology of uterine hemorrhages. Scanzoni's teachings (1860) concerning metritis seemed quite satisfactory until about 1870, when under the influence of Olshausen the uterine curette came into general use and made us familiar with the histologic picture of the endometrium. This led to the doctrine of endometritis as the cause of metrorrhagia, a misconception which has been corrected by Hitschmann and Adler only in the most recent years. Frequent failures in the treatment of metrorrhagias by curettage had given rise to various theories. Theilhaber ascribed hemorrhages to insufficiency of the muscular elements, Anspach to that of the elastic tissue of the uterine wall, while Ehrenfest assumed anomalies in the innervation of the myometrium. Sclerotic changes in the uterine vessels have been regarded as an etiologic factor from the days of Cornil (1888) to Gardner and Goodall (1906).

As regards the syphilitic uterus in particular, endarteritic and periarteritic changes were adduced to explain hemorrhages by Bonnet (1886), Gelli (1896), and Morisani (1901); and Spinelli (1901) summed up the prevailing views in the words: "A metrorrhagia resisting all treatment is a positive sign of latent syphilis which has caused endarteritis in the vessels of the endometrium." After Recasens, Franceschini (1909), and Jaworski (1911) had expressed themselves along similar lines, the theory of the angiosclerotic etiology of syphilitic hemorrhages seemed to have been placed on a firm basis. The literature on hereditary lues, too, furnished a widely quoted instance of syphilitic uterine "hemorrhage." This was the case of Joukowsky (No. 49),

where a heredosyphilitic child, born deeply asphyxiated, died five days after birth, "after persistent, though slight, bloody discharge from the vagina which had lasted one day." At autopsy, hemorrhagic areas were found in the fundus; the arteries showed endarteritic changes, several smaller arteries being entirely obliterated.

On the other hand there is abundant evidence at hand to prove that angiosclerosis is not essentially a syphilitic phenomenon and that angiosclerosis stands in no relationship to uterine hemorrhage. We need but refer to Pankow, who found sclerosis of the vessels in the uterus of the multiparous woman in every one of the many cases examined, and to Proesser (as quoted by Lewis Watson Smith in 1914), who examined microscopically two hundred uteri and found some degree of angiosclerosis in all of them. Among these there were cases without hemorrhage, but with a very marked angiosclerosis, and others with only slight sclerotic changes, but with a history of profuse hemorrhages. Smith justly concludes: "Sclerosis of the uterine vessels has nothing to do with hemorrhage; it is only a complication of a condition outside the uterus which is the cause of hemorrhage."

The oft-made assertion that the specific effect of potassium iodide on sclerosed vessels causes cessation of hemorrhages requires a different interpretation. The beneficial influence of potassium iodide can not be questioned, but it is not due to any direct influence upon the sclerosed uterus.

To sum up: *Metrorrhagia is not necessarily a syphilitic symptom nor can it be explained as the result of any local condition in the uterus. It cannot, therefore, be regarded as a typical symptom of uterine syphilis.* This, of course, does not exclude the possibility that in a syphilitic bleeding uterus there may be changes in the endometrium, such as we have mentioned in a previous chapter, but these are not the cause of hemorrhages. Moreover, in the most obstinate

cases of obscure metrorrhagias the endometrium has often been found normal or even atrophic.

We shall have made a great step forward in this whole question if we accept the ovarian origin of all uterine hemorrhages save those caused by abortion, polyps, and carcinoma. This modern doctrine has influenced the views of Ozenne, Siredey, Bab and others with regard to syphilitic hemorrhages. Dalché holds the syphilitic ovary, in its first stage of swelling, responsible for metrorrhagia and, in its later stage of sclerosis, for amenorrhea. Muratow follows Dalché's lead. Other writers, *e. g.*, Jouen and Wassilieff, somewhat confuse the issue by attributing the causation of uterine hemorrhage also to the affected tubes.

Does this mean that in cases of uterine hemorrhages the ovary must be the seat of a specific lesion?

Generally speaking the function of the ovary may become abnormal either from a disturbance in the organism at large or from a local affection of the ovarian tissue proper, an infection, congestion, tumefaction, or the like. The disturbed activity of the ovary expresses itself in disturbances of menstruation both in the form of amenorrhea and of menorrhagia or metrorrhagia. We have spoken above of amenorrhea due to temporary suppression of ovarian function, which in turn has been brought about by syphilis. Conversely, Audrain suggests that toxines liberated by spirochete may stimulate various organs to hyperfunction. Dalché and Fouquet surmise that in certain syphilitic metrorrhagias, the genital organs themselves are quite intact, but that the syphilitic virus has affected the thyroid, adrenals, or hypophysis and thereby caused a disturbance of equilibrium in the chain of the glands of internal secretion. Observations quoted by them from Laschkewitsch, Ozenne, Edmond Fournier, and Gaucher and Solin seem to refer to cases of heredosyphilis. Goldenstein assumes, in luetic metrorrhagias, a general diathesis comparable to that of malaria and diabetes.

These quotations suggest the possibility of metrorrhagias in syphilitic subjects without any local lesion in the ovary itself.

As to local specific lesions in the ovary, we have pointed out in a preceding chapter that the parasites have never yet been found in the ovaries of the adult woman. It is possible that in syphilis as in other infectious diseases (parotitis, scarlatina), the ovary may become inflamed, and we have already referred to the acute swelling of the ovary in earlier stages of the disease, as claimed by Franceschini, although it is hard to understand why only one ovary should be affected. Such a toxic oöphoritis might easily cause metrorrhagias, and the latter would cease promptly upon specific treatment because the ovary would be benefited indirectly by the treatment.

We have seen above that the most frequent type of ovarian syphilis is supposed to be the sclerotic or sclerogummatous and sclerocystic ovary, and we have expressed our doubt as to whether these forms, which we see so frequently, have in reality anything to do with syphilis. If such ovaries were the cause of uterine hemorrhages, it seems difficult to explain how cessation of bleeding could be brought about so promptly by medication, inasmuch as syphilographers rather generally admit that sclerotic changes can not well be influenced by potassium iodide.

The literature of syphilitic hemorrhages contains very little information regarding the size of the ovaries. They were enlarged in the two patients of Jaworski (Nos. 44, 46), one of whom positively, the other probably, had gonorrhea. In three cases of Ozenne (Nos. 85, 86, 88) the ovary is described as large, and only in the case of Bouilly (No. 16) is it spoken of as small, but in this case the diagnosis of syphilis is far from certain.

Our personal opinion is this, that metrorrhagias in a syphilitic woman do not signify the presence of a specific lesion in the ovary.

We believe that syphilis, by the infection of the entire organism, produces in some cases directly or indirectly disturbances in the function but not the tissue of the ovary and that these ovarian disturbances cause menstrual disturbances in the form of hemorrhages. We add to this, however, that only in 33 out of the 57 cases of uterine hemorrhage collected from literature could we accept the diagnosis of syphilis as established. In one case (No. 116), to give an illustration of the validity of some of the reports, the only symptom upon which the diagnosis is based is loss of hair, in a woman aged sixty-three years.

There is one more point which to us disproves the possibility of local lesions either in the uterus or ovary as the cause of uterine hemorrhages, namely, the effect of antiluetic therapy, or, more specifically, the time required for successful treatment. In most cases the cure is described as "prompt" or "final." In some instances, the effect is amazingly quick. In the case of Guillemot (No. 39) the hemorrhage ceased three days after the first calomel injection. De Pace's patient (No. 21) was cured within fifteen days. Gelli's case (No. 38), infected twenty-four years previously, had been flowing slightly, but continuously, for five months; she, too, was cured in fifteen days. Laffont's patient (No. 51), syphilitic for more than nine years, was restored to health in three weeks. On the average four to eight weeks have been required to relieve the patients from their hemorrhages.

It is extremely difficult to see how a sclerosis of the uterine or ovarian vessels could have possibly been eliminated in three or fifteen or even twenty-one days, and, in fact, everything points to this: *that metrorrhagias, if at all due to syphilis, are caused by disturbed ovarian function but not by localized lesions.*

But is there enough ground to ascribe metrorrhagias in all syphilitic women to this disease? The frequency of

positive Wassermann reactions in such patients would suggest an affirmative answer. Runge had a positive Wassermann in almost all of his fifteen patients with obscure metrorrhagias and cured a number of them by specific treatment. Schumann reported similar success in two cases. Whitehouse, in an interesting and most up-to-date contribution, found Wassermann positive in 7 out of 16 cases of metrorrhagia, *i. e.*, in 43.75 per cent. Griffith, quite logically, stated that this high percentage does not prove the etiologic relation between metrorrhagia and syphilis. We need but refer to the statistics of McIlroy and Watson, quoted in Chapter II, and the recent investigations of Horner. There is, further, to be considered the frequency of coexistence of syphilis and gonorrhea. The one gives the positive reaction, the other possibly causes the hemorrhage. Then, too, most of the metrorrhagias in the appended case reports occurred in parous women, many of them with the history of previous miscarriages upon which alone the diagnosis of syphilis is only too often based. Thus a luetic woman may present herself in the clinic for the treatment of metrorrhagias which have nothing to do with her syphilis but are the sequels of former abortions.

SUMMARY

Syphilis may be the causative factor of disturbed menstrual function for various reasons. Impairment of general health, and disorder in the harmonious synergism of all endocrine glands through the affection of one, may in the course of a luetic infection interfere with normal ovarian activity.

Therefore, in syphilitic patients specific medication may correct a menorrhagia or metrorrhagia which has proved refractory to the customary

modes of treatment. Such prompt therapeutic effect, however, does not permit of a diagnosis of luetic processes in the uterus or in the ovaries, because uterine lesions probably never, and syphilitic ovarian lesions, if acutally existing, are but rarely responsible for abnormal uterine hemorrhages.

The Wassermann reaction is found positive in a very large percentage of patients suffering from metrorrhagias. This is not surprising. Luetic women through the common complication with gonorrhea and as the result of frequent abortions are particularly prone to develop gynecological anomalies in which irregular uterine hemorrhages represent a predominant symptom.

We are thoroughly in accord with those writers who recommend a trial with specific therapy before radical treatment is decided upon for all cases in which a uterine hemorrhage is not definitely explained by local findings.

Chapter XI

Infectiousness of the Physiologic Secretions of Syphilitic Women

The following two premises are generally accepted:

1. Syphilis is a contagious disease in the strict sense, *i. e.*, one which spreads by direct infection only.

2. In 90 to 93 per cent. of all cases the disease is transferred by immediate contact in sexual intercourse.

It is, furthermore, an established fact that there are marked differences in the frequency of syphilitic ulcerations in the female genital tract as a whole as compared to luetic

infections of the penis. La Mensa found in 3257 syphilitic women only 675 who had ulcers either of external or internal genitals. Lambkin, on the other hand, introduces statistics which shows that of 481 chancres in men, 460 were found on various parts of the penis and scrotum.

The question, then, arises, whether a man may become infected by cohabiting with a syphilitic woman even though the latter does not exhibit any specific lesion upon the genital tract. In other words, are the physiologic secretions from the genitals of syphilitic women contagious?

A priori an affirmative answer suggests itself, although this particular problem has not yet been made the subject of extensive study. The syphilitic infection spreads by way of the blood stream into all organs and tissues of the body. We know from numerous observations and experiments on man and animals that the blood of syphilitics is infectious (Gougerot, Uhlenhut and Mulzer, Neisser). The four successful inoculations by Fruehwald into the testicles of rabbits show that even in the latent stage of syphilis, and with a negative Wassermann, the blood retains its virulency.

The Spirocheta pallida has been found in the circulating blood by a number of investigators, though failures in demonstrating the organism far outnumber the successes. This difficulty may be due to the small number of spirochetes actually present in the blood or, as Engman suggests, to the possibility that they form quiescent colonies in the wall of the aorta and other large vessels, from which they issue forth into the circulation only at intervals, perhaps prior to the appearance of recurrent lesions.

In the menstrual blood of syphilitic women the search for Spirocheta pallidæ has thus far remained futile with the sole exception of the observation of Mueller, as quoted by Chase. We have been unable to locate the original article. A prostitute was suspected of infecting men with syphilis

and was examined repeatedly, but presented no luetic symptoms or lesions. Later, Wassermann was found positive and *spirochetes were demonstrated in her leucorrheal and menstrual discharges.*

In this connection the experiment by Brumpt may be mentioned, who, seven days after infection of a *macacus cynomolgus* with Spirocheta Duttoni, recovered the organism from the menstrual blood of the animal.

More recently, McDonagh and Ross have described intracellular bodies within the leukocytes which they claim to be a stage in the development of the specific spirochete and characteristic of syphilis, as they have not been observed in man apart from the disease. Whitehouse has succeeded in finding these intracellular inclusions in two out of five cases in which the menstrual blood was examined.

The problem might, perhaps, be attacked by artificial cultivation of Spirocheta pallida, and we have induced Dr. Moyer Fleisher, assistant professor of bacteriology, St. Louis University Medical School, to undertake a series of experiments for the purpose of demonstrating the organism in the menstrual blood. These investigations have not yet been brought to conclusion and will be reported separately. Theoretically, at least, infection through menstrual blood seems highly probable.

We possess more accurate data regarding the infectiousness of other physiologic secretions, for Graefenberg found, in four cases, living spirochetes in the secretion from the cervix. Two of these patients were pregnant; all four had condylomata lata on the vulva but no lesion upon the cervix. In five other women who had received specific treatment spirochetes could not be found in the cervical secretions.

We have examined the cervical discharge in a large number of cases and wish to put the following results on record:

PERSONAL OBSERVATION XVI

Mrs. P. (Adm. No. 11816–15), white, entered the hospital December 14, 1915. Menstrual history normal. Married seven years. Three premature children who were born dead or died soon after birth. The last child was born at full term four years ago and is alive and well.

She received salvarsan for "a sore on vulva" two years ago and has remained well until recently. She is now complaining of a large abscess in the upper and inner part of the left thigh. The inguinal glands are enlarged; those on the left are tender. She also has a very small round ulcer, surrounded by a reddened halo, in the fourchette. *Both vagina and cervix are perfectly normal.* Indian ink smears were made from the ulcer and did not contain spirochetæ. *In the slides, however, made from the cervical secretion, four typical spirochetes were discovered after an hour's search.* Wassermann was + + + +. Indian ink smears were again taken from the ulcer and the cervix two days later, but this time no spirochetes could be seen.

PERSONAL OBSERVATION XVII

This is the patient whose history and condition has been given as Personal Observation VII. She had secondary lesions upon the cervix which healed under energetic treatment. Smears from the *vaginal* secretion taken several months later show, in dark field illumination, a great many spirochetæ, but not of the pallida variety as they move too quickly, are longer than the pallida and have too few and too long spirals and non-projecting ends, so that the entire organism is almost straight. *On the other hand the secretion from the cervical canal, though quite clear and apparently normal, contains a number of typical Spirochæta pallida.*

SUMMARY

Although few in number, these findings of Graefenberg and ourselves demonstrate, as an incontrovertible fact, that during the secondary stage women may cause infection even though

there are no specific manifestations about the genitalia. It is possible, says Graefenberg, that the search for spirochetes in the secretion of vulva, vagina, and cervix will become as important a part of our diagnostic technic as is the stain for gonococci. The prognosis of danger from infection as well as the date of cure may depend upon such an examination.

Chapter XII

SYPHILIS AND CARCINOMA

That syphilis represents one of the predisposing factors in the etiology of cancer may be accepted as an established fact. The dermatologists have often seen a luetic lesion of the skin become transformed into epithelioma. The observations of surgeons leave no doubt as to the syphilitic basis of many cases of buccal and glossal cancers, and the genito-urinary specialists are familiar with the occurrence of cancer of the penis and testicle as sequels to specific affections of these organs.

The gynecologic literature is not quite so replete with instances of this kind, yet they exist. A case in point has been reported by Doutrelepont: A pregnant woman with marked general manifestations of secondary lues had a deep indurated ulcer on the right labium majus surrounded by condylomata lata. Under specific treatment all signs of syphilis disappeared; the ulcer decreased in size and showed beginning cicatrization. Confinement at full term took place three months later. During the puerperium the ulcer started growing anew despite a second course of specific treatment, and quickly developed into a large ulcerating new growth which was extirpated with the thermocautery.

The microscopic diagnosis was carcinoma. The patient eventually died of metastases.

As regards the uterus, and more particularly the cervix, convincing proofs of the interrelations of syphilis and cancer are even more meager and we are forced, for the present at least, to rely chiefly on the analogy with other regions of the body. The following four possibilities suggest themselves:

1. An alteration of all tissues of the body caused directly or indirectly by the syphilitic virus ("*Gewebsumstimmung*" of Neisser), whereby the defensive apparatus of the organism are weakened. Several authors have gone so far as to apply the term "parasyphilitic" to cancer, a term which, in the definition given by Andrewes, covers diseases not in themselves syphilitic, and occurring at times independently of syphilis, but in the great majority of cases affecting persons who have suffered from syphilis. It would appear that syphilis leaves behind a tendency to certain changes, usually of a degenerative nature, which may become apparent long after all active signs of the disease have ceased. But it must be remembered that the subjects of parasyphilitic disease may still be in the stage of latent or indeed active syphilis. The term "parasyphilitic" does not imply that the syphilis is necessarily a thing of the past, and it may be for this reason that the Wassermann test is so frequently found positive in cancerous patients. Suffice it to state here that Caan, in 85 cases of cancer, found Wassermann positive in 41 per cent. On the other hand, Foerster (36 cases), Noguchi (39 cases), Fox (210 cases) and others have but very exceptionally met with a positive Wassermann in malignancy, and have arrived at the conclusion that only those cases of cancer give a specific reaction with a proper technic who have either evidences of syphilis or presents a history of previous infection.

These last-named contentions seem to be corroborated by

observations made by Dr. Rudolf Buhman, serologist to the Barnard Free Skin and Cancer Hospital in St. Louis. Dr. Buhman very kindly placed these records at our disposal. He has made Wassermann tests on 132 cases of malignant disease of all possible types; in each and every case the diagnosis had been verified by the microscope. Only 9 out of these 132 cases gave a positive Wassermann. In 6 of these Wassermann became negative or weakly positive under specific treatment. The remaining three cases were lost out of sight. In his tests Dr. Buhman uses three antigens in each instance.

The probability of a causal nexus between syphilis and cancer on one side and the divergence of laboratory findings on the other would render further researches in this direction most desirable.

2. Any part of the body which in the past has been the seat of a syphilitic lesion becomes a *locus minoris resistentiæ* wherein a cancer may develop. Syphilitics, says Horand, are potential candidates for cancer and live forever beneath a sword of Damocles. If a cancer occurs in a syphilitic subject it will always seek the vulnerable spots which have already been marked by syphilis. It is possible that Kaarsberg's third case, in which he found an incipient cancer of the cervix in a syphilitic, belongs in this category.

3. Leukoplakia as a connecting link between syphilis and cancer. Leukoplakia is an affection of certain mucous membranes and is characterized by an increased formation of keratin in the superficial layers of the squamous epithelium and a marked hyperplasia of all other constituents of the mucous membrane until the latter closely resembles the epidermis in microscopic appearance. These changes result in the production of bluish, pearly, or grayish-whitish plaques which are either level with the surrounding mucosa or slightly raised if the hyperplastic process has been excessive. This true leukoplasia or leukokeratosis must be differentiated

from the spurious leukoplasia which, according to Jayle and Bender, is simulated by a pseudomembrane of fibrin, leukocytes, and desquamated epithelium.

True leukoplasia is most often found on the oral and vulvar mucosa, but also, though less frequently, in higher parts of the vagina and upon the cervix.

The question as to the causation of leukoplasia has not yet been settled. While Kaposi believed that every hyperkeratosis of a mucous membrane is due to syphilis, a view which is shared by Verdalle, Franceschini, Landau, Gaucher, Fordyce, and others, Sweeney, Hillman, and Schwimmer deny any such relationship. The majority of writers, among whom Neumann, Janowski, and Lublinski may be mentioned, occupy an intermediate position and contend that syphilis is the most frequent cause of the development of leukoplasia. Power summarizes the question by saying that leukoplasia bears a very intimate relationship to syphilis, and although it is not yet possible to state that every case of leukoplasia is syphilitic, it is remarkable how few other causes of chronic irritation produce this particular change in the mucous membranes.

On the other hand, there is a general consensus of opinion that leukoplakia shows, in almost all cases, a very pronounced tendency toward malignant degeneration. The literature on this question is voluminous but can not be considered in detail as not wholly germane to our subject. As far as leukoplasia and cancer of the cervix and vagina are concerned, bibliographic references and personal observations are recorded in the papers by Sweeney, Verdalle, v. Franqué, and Loehnberg.

We may thus epitomize that leukoplasia of the cervix is almost always due to syphilis and may sooner or later develop into cancer.

4. The direct transition of syphilitic into carcinomatous tissue. As far as the uterus is concerned, only two authors

claim to have accurately observed the transformation of a gumma into a carcinoma. One of these is Kaarsberg, whose original article was not at our disposal, and the abstract merely states that "a cancer had developed in a syphilitic ulceration." The other is Franceschini, who bases his views on three personal observations. Two of these (Nos. 31, 32), however, plainly belong to the category of cancer in syphilitic subjects; and only in the third (No. 30) is there a suggestion of transition of syphilis into carcinoma. Unfortunately the value of this report is problematical. The description of the alleged cancer is quite insufficient, as no microscopic examination has been made and the patient not been kept under subsequent observation.[1]

We must, then, conclude that the direct transition of a syphilitic lesion of the uterus into carcinoma has not yet been convincingly demonstrated, but we hasten to add that such a process seems to us quite possible.

The probable mode of such transformation will become clear by a study of the following two cases, one of our own material, the other from literature.

PERSONAL OBSERVATION XVIII

Our own case concerns a colored woman, L. D. (Adm. No. 16495–15), aged thirty-eight years, who was admitted with marked symptoms of tertiary lues (rectal stricture, retrovaginal fistula, iritis and retinitis, amenorrhea, cachexia, Wassermann ++++). She entered the hospital March 3, 1915, to be operated upon for total prolapse of the uterus. There were a number of irregular, shallow ulcerations upon the prolapsed anterior vaginal wall and cervix which were diagnosed as decubitus ulcers. In addition, two deep and somewhat indurated ulcers extended from

[1] The numerous instances in which cancer of the uterus has been diagnosed erroneously, or the few examples in which syphilis has been mistaken for cancer, obviously do not belong in our present discussion. They have been considered, in their proper connection, in the differential diagnosis of uterine syphilis.

the vestibule on either side of the urethral opening onto the anterior vaginal wall. In order not to overlook a possible malignant degeneration of these last-named ulcers a wedge-shaped piece, including the adjoining normal mucosa, was excised for microscopic study. This section is represented in Fig. 16. The healthy epithelium on the extreme right of the picture is of the normal multiple squamous type intersected by narrow papillæ. Beneath the epithelium a slight infiltration of small round cells. This subepithelial infiltration becomes more marked as we approach the ulcerated portion and gradually turns into a thick layer of dense lymphocytic infiltration which separates the epithelium from the underlying connective tissue. Here and there the surface epithelium is absent and the infiltrated tissue lies bare. In these places it assumes the character of true granulation tissue with an enormous proliferation of bloodvessels and protrudes mushroom-like above the surface. The number of bloodvessels is so large that one may almost speak of an angioma. In all vessel lumina there is a proliferation of the intima so that the lumina are either entirely obliterated or reduced to narrow slits. Within the lymphocytic infiltration masses of larger granular plasma cells are easily distinguishable even without any specific plasma stain. In the left extremity of the picture, the squamous surface epithelium again appears but shows, in one place, an entirely different behavior. It sends long, slender, and ramefying processes deep into the underlying area of infiltration. This epithelial proliferation resembles that of an incipient carcinoma were it not for the fact that the invasion does not extend beyond the granulation area into the preformed connective tissue and that the basal layer of the epithelium is intact. These basal cells are arranged regularly and their size is uniform.

In view of these findings and the symptoms of the case, a diagnosis was made of syphilitic ulceration.

Patient left the City Hospital before any therapy had been instituted, but entered the Barnard Free Skin and Cancer Hospital on April 16, 1915 (Adm. No. 14248). She was subjected to energetic antiluetic treatment and when the vulva and vaginal ulcerations had healed, she was operated upon for prolapse on August 18, 1915. The excised vaginal mucosa showed an entirely different appearance at the site of the former ulceration. The squamous epithelium was uniformly low and there

were only traces left of the former subepithelial infiltration. The bloodvessels in the deeper stroma layers still showed endarteritic processes here and there and also some perivascular infiltration but to a very much milder degree than had been observed before the antiluetic treatment five months previously.

The heterotopic proliferation of the surface epithelium observed in this case is in itself not suggestive of malignancy. Robert Meyer has found even more pronounced pictures of this sort in all possible organs, and has called attention to the fact that such atypical proliferation and invasion of the epithelium may occur if the underlying tissues become less resistant by inflammatory infiltration of the connective tissue or the formation of granulation tissue whereby the physiologic borders between epithelium and stroma become effaced.

In its further development, however, this heterotopic behavior of the proliferating epithelium may assume a different and more sinister aspect. This second phase is well illustrated in an observation reported by Rohrbach. The patient in question had an ulcerating tumor of the right labium majus the differential diagnosis of which was between gumma, carcinoma, or a combination of the two. Microscopic examination showed conditions identical with those in our case. The proliferating squamous epithelium also extended deeply into the underlying infiltration in the form of freely anastomosing processes in which the normal staining quality of the epithelium was preserved and the basal membrane well marked. In one place, however, the arrangement of the basal layer had become disturbed. (See Fig. 17.) The nuclei had become larger, stained more deeply, and were located irregularly. The basal membrane was broken through by three projections formed by one to three cells each. In still another place, the columns of cells invading the tissue had lost all resemblance to the normal constituents of squamous epithelium. The nuclei had become

large, light in color, and vesicular, and the contours of the cell bodies hardly distinguishable. In the deeper layer of the granulation area a mass of atypical epithelial cells was found without any direct connection with the epithelial proliferation on the surface. Degenerated and broken-off elastic fibers were seen not only at the periphery of this complex of cells but also in between them. (This behavior of the elastic fibers has been declared characteristic of carcinoma by Abel a number of years ago.)

There was, then, in these sections a condition which closely resembled that described by Ribbert in the earliest stages of cutaneous cancer, and Rohrbach withheld the diagnosis of malignancy merely because the epithelium proliferated only into the infiltrated area without invading the preëxisting tissues beneath.[1]

Moreover, Wassermann was made in the meantime and

[1] In the light of this microscopic study we can better understand the case reported by Howitz (No. 41). A woman, aged thirty-two years, with three children, the youngest four years old, had a small tumor on the cervix which was excised and declared to be an epithelioma. Less than three years later she returned with an apparent recurrence of the tumor but on the opposite side "of the anterior lip of the external os." This tumor was also excised, and again the microscope confirmed the assumption of epithelioma although the shape and consistency rather suggested a fibroma. The fact that the recurrence had developed at another point was suspicious, and Howitz, then, discovered that the patient had acquired syphilis at the age of seventeen years. She had been thoroughly treated and had been in perfect health since. The most minute examination failed to reveal any signs of it, except, possibly, the uterine affection. A course of potassium iodide was instituted and the woman has since passed through a normal pregnancy. No spirochetes could be found in the placenta or any signs of syphilis. The woman has been in the best of health in the three years since and has been saved a severe mutilating operation.

It is permissible to assume that microscopic pictures like those of Rohrbach's existed in this case, which might have baffled even the most experienced microscopist. The difficulties of microscopic differentiation are still further illustrated in Wegscheider's case of gumma cervicis (No. 138) which was pronounced "either carcinoma or sarcoma" by an authority of international reputation.

found strongly positive. Salvarsan and KI. produced, within ten days, a remarkable change both in the clinical condition and in the microscopic picture in which perfectly normal conditions were found reëstablished wherever endarteritic processes had not interfered with the circulation.

These two cases, the detailed account of which is justified by the extreme importance of the question, throw light upon the histogenesis of certain forms of cancer. From the atypical proliferation in our case and the formation of abnormal epithelial cells in Rohrbach's report to a truly malignant invasion into foreign, preëxisting tissue seems but one step. In most instances the macroscopic syphilitic lesion or other symptoms of the disease are likely to call for appropriate treatment and thus interfere in time with the threatening transformation into carcinoma; but if the case be neglected there is every reason to believe that such a transformation actually takes place.

This last contention seems to be borne out by clinical observations. Howitz mentions Bergh's statement that during the thirty-eight years in which he was in charge of the hospital for prostitutes he encountered only one case of cancer of the uterus among them. Howitz suggests that this seems to indicate that thorough and repeated specific treatment of the syphilis—such as these prostitutes received, nearly all having contracted syphilis early in their careers—may have a prophylactic action against the development of cancer later.

Chapter XIII

GENERAL CONCLUSIONS

The summaries given at the end of practically all the preceding chapters may be referred to as expressing our conclusions on the various special topics under consideration and need not here be repeated.

There are, in addition, a number of more general, broader conclusions which suggest themselves.

While actual and well-established facts regarding syphilis of the female genital organs are comparatively few in number in contradistinction to the many theories and the volume of literature on this subject, yet enough is known to compel and hold the interest of the gynecologist.

Syphilis may cause organic lesions in all parts of the genital tract, such as ulcerations and tumefactions. The gynecologist will be able to properly interpret and treat such lesions only if he is familiar with the local pathology of syphilis. He may also meet with functional disturbances within the genital sphere, not explainable by any local findings, which may be due directly or indirectly to the influence of syphilis.

There are close analogies between the genital organs in the male and the female from a purely developmental and anatomical point of view. The fact that the ovaries correspond to the testicles, the tube to the epididymis, the uterus to the prostate, has seemed, to many writers, sufficient to base deductions as to the pathology of syphilitic lesions in the female upon their knowledge of luetic lesions in the male. Such reasoning is faulty. Syphilis, in many respects, affects woman in a manner essentially different from man. After all, there is nothing in man to compare with disturbances of menstrual function which so often confront the gynecologist.

Gynecology has, in the past, profited by the pioneer work of dermatology in the realm of syphilis. It is now time that the gynecologist should contribute his full share. There are still many mooted questions, such as syphilis without primary lesion (*syphilis d'emblée*) or the pathology of local lesions in the female genital tract, which the gynecologist is preëminently fitted to solve.

He should also fall in line with the representatives of other specialties in advancing the problem of the relationship

between cancer and previous syphilitic lesions in the same locality.

Familiarity with syphilitic lesions in the genital tract must needs prove of eminent practical value to the gynecologist in view of the frequent confusion in the diagnosis of cancer and syphilitic ulcerations or gummata. That occasionally a patient is subjected to a serious radical operation who could have been cured by antiluetic treatment there can be no doubt.

A more intimate interest in the problems of syphilis of the internal female genitalia will advance gynecology both in its theory and in its practice.

Chapter XIV

Collection of Case Reports[1]

Aievoli. (Annales des mal. vénér., November, 1906.)

No. 1. Woman, aged thirty-nine years. After having been infected by her husband, had given birth to three premature dead children. Later exhibited typical symptoms of uterine catarrh which resisted the usual treatment. Mixed treatment together with some local applications brought about complete cure.

Ballantyne and Williams. (Brit. Med. Journal, 1891, vol. i, p. 171.)

No. 2. Postmortem findings in syphilitic fetus of seven months: Many of the tubal folds were adherent at their apices, forming transverse bands. In the muscular wall were a few deposits of small round cells exactly resembling those found in the liver and other organs of the same fetus. These were the syphilomata of Parrot, by other authors called miliary gummata.

[1] Unless otherwise indicated these histories were abstracted from the original publications.

Barthélemy. (Unpublished case quoted by Laffont, p. 244).

No. 3. Woman, aged fifty, never pregnant, menstruating regularly. Twelve years ago she had a bubo which was cauterized. Later a general eruption appeared for which she took pills. Since then migraine at time of menstruation. Patient's husband had been told that he was infected and had received mixed treatment.

For the last four weeks patient has a small sore at fourchette and left labium. Findings: An ulcer with uneven base. Its edges sharp but irregular. Diagnosis: syphilitic ulceration.

A similar ulcer, well outlined, upon the cervix to right of external os extending into cervical canal, also interpreted as ulcerated syphilis. Vaginal fornices free from infiltration. Uterus normal.

Fournier who saw the case in consultation made the diagnosis of a tertiary lesion.

No. 4. (Annales de Dermat. 1895, vi, p. 1006.)

A syphilitic ulcer of upper vagina covering the entire cervix and extending into both fornices. It resists all local treatment but heals rapidly under mixed treatment. Diagnosis: gumma of vagina.

No. 5. (Ibidem.)

Woman, syphilitic for nine years, A tumor in rectovaginal septum, size of pigeon's egg, oval, hard, smooth, not fluctuating, only slightly tender. Under specific treatment mass disappeared within two months without breaking down. Recurrence eight months later, again treated successfully for two months. Third recurrence a year later, requiring treatment for six weeks, followed by permanent cure. Diagnosis: gumma of vagina.

No. 6. (Ibidem.)

Hereditary syphilitic woman of twenty-three with an enormous gumma, which, starting in cellular tissue between pubis and vagina, rapidly enveloped vulva, clitoris, urethra, and anterior vaginal wall. In the latter it assumed phagedenic characteristics. Cure within ten months after energetic specific treatment.

Betti. (Clinica ostetrica, VII, 1905, fasc. 6, quoted by Laffont, p. 232.)

No. 7. Woman of forty. Four confinements. Two years after last confinement she had menorrhagias and was treated

by the same physician who attended her syphilitic husband. Both partners received the same drugs, and after several months menses again became normal. After about ten years of good health, menorrhagias, later metrorrhagias appeared. Examination negative. Usual remedies with only transitory relief. Then again metrorrhagias. Trial with antiluetic treatment followed by rapid improvement within a short time and complete restoration of normal menses after five months of treatment.

No. 8. Woman of twenty-eight. One normal confinement eight years ago. Suffering for the last year with profuse menorrhagias and pain in lower abdomen. Uterus enlarged symmetrically, cervix indurated.

Speculum: Granulating erosion bleeding on slightest touch. Catarrhal mucus from external os. In view of these findings and the gonorrheal history of husband, the diagnosis of gonorrhea was made. Curettage, energetic intra-uterine and local treatment with internal medication. Cure obtained after about two months was only of short duration. Three months later menorrhagias reappeared with increased intensity. Usual treatment brought no relief. At that time, the husband consulted Betti for a second attack of gonorrhea, and now signs of an old syphilis could be discovered. He finally admitted syphilitic infection. Specific treatment of the woman yielded complete cure of menorrhagia after six months.

Birch-Hirschfeld. (Lehrbuch der patholog. Anatomie, 1877, p. 1161.)

No. 9. At autopsy of woman fifty-four years of age, old gummata were found in liver; also characteristic cicatrices on the gums. Vagina constricted; vaginal mucosa smooth, pale. Vaginal wall and perivaginal connective tissue diffusely indurated by gummata, so that the vagina represented a thick-walled tube. Microscopically the diagnosis of a syphilitic perivaginitis was confirmed.

Blandin. (L'Obstétrique, vii, 1902, p. 43.)

No. 10. In a woman, pregnant eight months and presenting numerous syphilitic manifestations, an extensive, indurated ulceration of the cervix was discovered. Its base was irregular, its contour fairly well marked. Blandin anticipated dystocia from the rigidity of the cervix.

Bockhart. (Monatshefte f. prakt. Dermatologie, iv, 1885, p. 417.)

No. 11. Patient, aged twenty, complained for the last two weeks of occasional pain during cohabitation which is followed by the discharge of a few drops of blood from vagina. External genitalia normal. Vagina narrow. Cervix and external os appear normal in speculum. On posterior vaginal wall, just above middle, a large ulcer, bleeding apparently as result of pressure of speculum. Ulcer is perfectly round, diameter about 2 cm., surrounded by a slightly raised, about 2 mm. high and equally wide edge which gradually flattens down to level of ulcer. The latter almost completely covered with a grayish, firmly adherent film. Where this is missing the wound looks granular, dark red, glistening. The edge is hard; base of ulcer slightly indurated. On lateral pressure from both sides the disk-like, flat (*"lamellose"*) induration can be ascertained. No pain during these manipulations. Enlarged inguinal glands can not be made out. No other abnormal manifestations on body.

Diagnosis: primary chancre in vagina.

Boldt. (New York Academy of Medicine, April 27, 1899, quoted by A. Martin, Krankheiten der Eileiter, Leipzig, 1895, p. 188.)

No. 12. Bilateral pyosalpinx removed from a woman, recently infected with lues. It is assumed that the syphilitic infection has caused suppuration in a serous sactosalpinx.

Bollag. (Correspondenzblatt für Schweizer Aerzte, 1914, xliv, p. 1068.)

No. 13. A woman of forty-four, referred from dermatologic to gynecologic department with diagnosis of suspected carcinoma of vagina, as Wassermann reaction had been found negative.

Twenty-three years ago she had had a venereal infection causing condylomata accuminata on external genitalia, treated by a homeopath. At that time vaginal discharge and burning pain on micturition. Denies any kind of skin eruption. During last ten years frequently annoyed by pruritus vulvæ. As the

result of scratching she often had suppurating and lately rather extensive ulcerations on vulva. Menstruation regular and normal. Never pregnant.

Cicatricial stenosis in the middle third of vagina. Uterus small, anteflexed. Adnexa normal. In right half of vestibule an area which shows the last traces of an ulceration. A similar ulcer on the left near hymen also practically healed. Tissues strikingly soft. No trace of pus. The location of the two ulcerations strongly suggests autoinoculation(*"Abklatschgeschwuere"*). Just above the constriction in the vagina there is a large rhomboid ulcer, about 1 x 3 cm., with smooth edges, not covered by a membrane, crossed by red furrows. No hemorrhage when its surface is rubbed. At the edges evidences of beginning cicatrization. Immediately below the constriction another triangular ulcer of same size on posterior vaginal wall, similar in appearance but with smooth, red surface, Vaginal portion of cervix smooth, normal. The tissues around these ulcers slightly edematous, but soft. Rectal mucosa normally soft, no rectal stenosis.

The posterior, lower ulcer excised for microscopic study. Typical granulation tissue rich in cells; thick walled vessels; plasma cells; lymphocytes and few leukocytes. No suggestion of lues, tuberculosis or newgrowth. Therefore, pathologico-histologic study negative as to diagnosis.

In spite of negative Wassermann (patient has never received specific treatment), in spite of negative history and negative findings, by exclusion of all other possible causes for these ulcerations and scar formation, tertiary lues is suspected.

Neosalvarsan and hydrarg. salycil. are given. Ten weeks later ulcers are found healed. Author makes final diagnosis of gumma of vagina.

Bosse. (Berliner Klinik, 1913, xxv, Heft, 296.)

No. 14. Patient, eighteen years old, primipara. Her father is a tabetic. As a child she had parenchymatous keratitis, later articular rheumatism. Wassermann positive. In the third week postpartum severe hemorrhage from uterus. As syncytioma was suspected curettage was decided upon. After dilatation of the cervix the uterus is explored digitally and a "large hole discovered in uterine fundus, easily admitting tip of the finger." Therefore, total hysterectomy is performed.

Muscularis very pale and friable. Specimen lost before thoroughly studied; the few pieces which had been examined showed nothing pathological either in vessels or muscularis.

Bosse explains the hole as due to a uterine rupture which had occurred during labor. In his belief the rupture was the cause of the hemorrhage, while the syphilis indirectly was responsible for the rupture.

He publishes the case as an example of late puerperal metrorrhagia due to syphilis.

Bouchard et Lépine. (Gazette Méd. de Paris, 1866, xlv, p. 726, quoted by Laffont, p. 164.)

No. 15. Postmortem examination of a woman, aged forty years, who had died after an attack of hemiplegia with asphasia. Both tubes thickened to the size of a finger. Tubal lumen obliterated. On section there are found in each tube three gummata, size of hazelnut, soft and of reddish color. Microscopic sections made and described. (This description does not mention any of the findings at present considered characteristic of tissues affected by luetic infection.)

The diagnosis of tertiary luetic infection and gummata of the tubes is based on the existence of similar tumors in liver and brain and a rarefying osteitis of the right clavicle.

Bouilly. (Contribution a l'étude de la syphilis des trompes et des ovaires, Thèse de Paris, 1905, quoted by Laffont, p. 215.)

No. 16. Woman, aged twenty-three years. One full-term confinement seven years ago followed by a slight infection. Later a premature labor in seventh month, and half a year ago a miscarriage in fourth month. For several years irregular uterine hemorrhages. Two and a half years ago curettage without distinct benefit. After last miscarriage metrorrhagias worse; abdominal pain; patient bedridden. No pathologic findings to account for the condition. Persistence of pain (especially during night) and continuous loss of blood force Bouilly to perform vaginal hysterectomy.

Specimen: Normal uterus, only slightly enlarged. Ovaries atrophic, size of hazelnuts. Tubes normal. During convales-

cence patient develops a deep slough over buttocks, resembling a syphilitic lesion, which disappears after specific treatment. Microscopic findings: Endo- and peri-arteritis, endo- and peri-phlebitis in uterine wall. Ovaries sclerocystic.

Bradley. (Manchester Medical and Surgical Reports, October, 1870, p. 45, quoted by Laffont, p. 163.)

No. 17. Woman of thirty-six years acquired syphilis after fourth confinement.

Subsequent to infection had five more children, all plainly syphilitic, two of them stillborn.

One week after last (ninth) labor had a uterine hemorrhage which, despite the usual styptic treatment, continued for one month and rendered patient profoundly anemic. Prompt relief after mercurial treatment. Two later recurrences of metrorrhagia were definitely cured by antisyphilitic treatment.

Brindeau. (Soc. d'Obst. de Paris, December 19, 1902.)

No. 18. In discussing the case of Blandin (see case report) of luetic ulcer on cervix observed during pregnancy, Brindeau mentions a similar observation of his own.

Dalché. (Gaz. des Hôpit., June 15, 1905, p. 795.)

No. 19. Persistent bleeding for the past twenty days in a girl of seventeen, presumably her first menstruation. A year previously she had been raped and infected with syphilis. Complaining of severe pain in the right side of the lower abdomen. Right ovary found enlarged, hard and very tender. Three days later hemorrhage ceased but pain continued.

The writer reasons that the continuation of the pain points to oöphoritis as the possible cause of the excessive amount of the flow, which, in his opinion, represents the first menstruation. It may be a case of menstrual oöphoritis, reminding one of "ovarian apoplexy." A diagnosis of sclerocystic, syphilitic ovary would have to be excluded in view of the short time since infection. He feels, however, that it is justifiable to consider this a case of syphilitic menorrhagia during the secondary stage

of the disease, though he realizes that in this stage amenorrhea is more common.

No. 20 Young woman, probably syphilitic. Menstruation regular and normal. Married two years. One miscarriage in seventh month. Puerperium normal. At present suffering from an indolent left salpingitis. Patient is given mercury; two months later salpingitis is much improved.

In his opinion it is justifiable to think in this case of a syphilitic salpingitis.

De Pace. (La Clin. Ostetr., 1907, xvii, 385, quoted by Laffont, p. 242.)

No. 21. Woman of forty-two. One normal confinement, two premature ones, and two miscarriages. Has had malaria. At present a profuse menstrual hemorrhage of twenty days' duration with severe pain in lower abdomen, and fever.

Miserable general condition. Excruciating pain. Unable to walk. Pulse rapid.

Abdomen tympanitic, very painful; spleen enlarged. Uterus enlarged, cervix slightly swollen. On right side and also behind uterus two very painful, hard masses.

Diagnosis: syphilis and malaria.

Mercury and quinine followed by rapid improvement. After fifteen days no trace of tumors. Continued specific treatment completely checked hemorrhage.

Doenhoff. (Inaug. Dissertation, Kiel, 1888, quoted by A. Martin, Krankheiten der Eileiter, p. 187.)

No. 22. Newborn child died from congenital lues. Tubes thickened in their entire length, strikingly tortuous, stiff walled, some of the coils tightly adherent to each other. Vessels dilated. Musculature and connective tissue hyperplastic, rich in cells. Folds of mucosa well developed, also rich in cells. Epithelial covering regular, well preserved, lumen free.

In the opinion of Martin this is an important record because "in this case any other possible etiologic cause for the anomaly can be excluded."

Doléris. (No bibliographic reference, quoted by Barthélemy in La Syphilis, 1905, iii, p. 695.)

No. 23. Specimen of tertiary syphilitic tubes demonstrated before a medical society. The tubes were hypertrophic and sclerosed, more than twice the normal size.

Dreyer. (Dermatol. Zeitsch., 1906, xiii, p. 544.)

No. 24. Luetic infection acquired within last three years; exact time can not be ascertained. For last year had profuse genital hemorrhages not benefited by customary treatment. Large, moist papule on external genitals, roseola on trunk, ulcerated patches on both tonsils. Some improvement after 16 inunctions followed by deep injections. Two and one-half months later normal menstruation; all syphilitic manifestations practically cured. From then on menstruation was normal.

Duparcque. (Maladies de la matrice, Paris, 1837, p. 133, quoted by Lancereaux, vol. i, p. 288.)

No. 25. Patient had three syphilitic and scrofulous children. By palpation, a hard and mammillated enlargement of the cervix is found which dilates the upper part of the vagina. Its smooth surface presents a depression near the left angle of the external os. At this point, which is more tender to touch, an ulcer appears to exist. Patient does not permit examination with speculum. Persistent vaginal discharge, yellowish, sometimes bloody, of disagreeable odor. Constant pain in region of kidneys, burning sensation in lower part of pelvis, lancinating pain especially during night. Under the influence of inunctions with calomel ointment the neck of the uterus regained its normal size in less than three months and menstruation was restored.

Then a relapse occurred. "The existence of a scirrhus of the neck of the uterus might have been suspected, so extensive and hard was the enlargement, so large and deep the ulceration. However, thanks to the knowledge of the venereal antecedents of her husband, the same specific treatment was repeated." Cure was quick and complete. No recurrence within the next six years.

Falk. (Zentralbl. f. Gynäk., 1908, p. 347.)

No. 26. Patient, aged thirty-five years, without history or symptoms of lues. Full-term child born nine years ago still alive. Before and after this birth a miscarriage. Curettage for vaginal discharge and metrorrhagia a year ago, without benefit.

Findings: Ulcer at external os, crescentic, with a sharply outlined contour. Ulcer below level of surrounding mucosa; the latter of whitish color as though "cooked." Ulceration fatty, glistening ("*speckig*"), bleeding easily. Microscopic findings: Histologic picture characteristic neither of tuberculosis nor syphilis. Antiseptic local treatment of ulcer yields no result. Inunctions and potassium iodide cause prompt healing with disappearance of metrorrhagias.

Diagnosis: luetic ulcer of cervix with luetic metrorrhagia.

Fournier. (Annales de Dermat. et Syphil., 1895, vi, p. 1000.

No. 27. Woman of twenty-nine years, repeatedly treated for gummata of various regions, enters hospital complaining of dull ache in lower abdomen and burning pain during micturition. About 4 cm. behind the introitus on anterior vaginal wall a deep ulcer is found, its excavation as large as a hazelnut. Its edges are well defined, sharp and elevated. The base is yellowish-green and uneven; painful to touch. It is situated on an indurated base and surrounded, like other gummata, by an inflamed area.

Under specific treatment ulcer disappears within fifteen days.

Diagnosis: gumma of vagina.

No. 28. (Bull. Acad. de méd. de Paris, October 21, 1912, xlviii, p. 310.)

Man, thirty-four years of age, has a tumor in small pelvis apparently involving both bladder and rectum. Three distinguished physicians made the diagnosis of inoperable sarcoma. The patient gives no history of syphilis and does not show any characteristic syphilitic manifestations. The possibility of hereditary lues, however, is suggested by the fact that of fifteen brothers and sisters twelve had died at a very early age and one

living brother has a chorioretinitis which might be interpreted as a stigma of congenital lues. Mixed treatment results in complete cure.

This represents, in Fournier's opinion, a unique observation of a gummatous pelvic cellulitis developing at the age of thirty-four as the very first sign of a congenital lues.

Franceschini. (Clinica Ostetrica, 1905, p. 47, quoted from Laffont, p. 220.)

No. 29. A syphilitic woman of twenty-six with several abortions and premature and macerated fetuses, complained of profuse uterine hemorrhages, at first menorrhagia, later metrorrhagic in character. All kinds of treatment were applied in vain and the patient became seriously enfeebled and exsanguinated. Repeated thorough examinations failed to clear up matters. The history of the case and enlarged cervical and inguinal glands led Franceschini to suspect syphilis as the etiology of the hemorrhages. Mercurial treatment had the desired effect, and at the time of the report the patient had remained well for several months.

No. 30. (Annales des. mal. vénér., 1906, i, p. 241.)

Syphilitic woman of forty presents herself with profuse metrorrhagias alternating with serosanguinolent discharge. Cervical and inguinal glands enlarged. Uterus enlarged and hard. Upon the cervix an ulceration with raised edges. Diagnosis of syphilis was made and vigorous mercurial treatment instituted which, in a few weeks, brought about cicatrization and pronounced diminution in size of the ulcer. Hemorrhages and discharge disappeared. Thus improved, though not yet cured, the patient left the hospital against Franceschini's advice. One year later an epitheliomatous degeneration of the cervix was found exactly upon the site of the former syphilitic ulceration. Mercurial treatment instituted anew, only aggravated the condition.

No. 31. (Ibidem.)

Widow of fifty, without children, had been infected by her husband, who eventually died of cerebral lues. She has been treated, at intervals only, and not very systematically, for hemorrhages and vaginal discharge. For eight years she had

taken potassium iodide which relieved the condition, but in the last two years the remedy had failed to check the bleeding. Examination revealed inoperable cancer of the uterus. "Specific treatment did no good." Patient died a short time afterward.

No. 32. (Ibidem.)

Woman of thirty-five in whom secondary syphilis had been diagnosed five years previously. Treatment was insufficient owing to neglect of patient. Three miscarriages since. Uterus large, cervix small and hard. Diagnosis of glandular endometritis was made elsewhere. Franceschini, however, assumed syphilis to be the cause of the uterine enlargement and instituted specific treatment under which the uterus rapidly decreased in size. Feeling improved, the patient discontinued the treatment, but returned a year later, this time with a uterine cancer.

Fuller. (Morrow's System of Genito-Urinary Diseases, 1893, vol. ii, p. 463.)

No. 33. Young woman of doubtful antecedents, complaining of a pelvic inflammatory trouble which gradually was getting worse in spite of treatment.

Findings: In region of left broad ligament a tumor, size of orange, moderately tender.

As treatment thus far had been without success, patient is given large doses of potassium iodide, although no history of a luetic infection could be obtained. The patient began to improve immediately and after a time the tumor gradually disappeared.

"Although this case does not absolutely prove syphilis of this region, still it justifies one in strongly suspecting that such was the case."

Galliard. (Unpublished case quoted by Laffont, p. 250.)

No. 34. Aged twenty-three, generally enfeebled, suffering for some time past from profuse leucorrhea which at times is mixed with blood. She had had a cervical adenitis, probably of tuberculous origin. No history of syphilitic infection. However, patient states that her first child, born prematurely, had

died of syphilis according to the statement of attending physician. Second child also died soon after birth. Of late there has been a continuous metrorrhagia.

Findings: Cervix slightly enlarged, uterine fundus normal, anteverted. Slight tenderness over uterine fundus and in cul-de-sac. Mucosa of vaginal portion reddened. Drop of blood oozing from os. No pathologic findings to account for hemorrhage.

In view of information given concerning death of child a test was made with specific treatment. Rapid cessation of uterine hemorrhages, while the vaginal discharge persisted for another month. Later, metrorrhagias reappeared but again yielded promptly to another course of antiluetic treatment.

Garofalo. (Clin. Ostetrica, 1906, x, 224, quoted by Laffont, p. 237.)

No. 35. Girl of nineteen. Infected during first pregnancy. Child born at term, but died immediately. Marked general syphilis. One miscarriage. Troubled since this miscarriage with profuse bleeding, first only during menstruation, later metrorrhagic. Profound anemia. Pain in abdomen and kidney regions. Left adnexa slightly tender. Uterus normal, cervix large, congested. After twenty intramuscular injections of mercury return of menses to normal. Under continued treatment improvement observed for three months.

Gaucher. (Unpublished case quoted by Laffont, p. 246.)

No. 36. Woman, twenty-seven years old, without history of gonorrheal or puerperal infection, had been under treatment for syphilis manifesting itself in roseola, loss of hair, etc. About one and a half years after the assumed time of the infection she began having irregular uterine hemorrhages. No pathologic lesions can be discovered by palpation to account for the metrorrhagia. Syphilis is suspected as the cause. After several courses of specific treatment menstruation finally becomes normal. Diagnosis is made of late secondary or early tertiary hemorrhagic metritis.

Gaucher and Giroux. (Ann. des mal. vénér., 1913, viii, p. 534.)

No. 37. Woman of twenty-two with copious but painless discharge from the vagina. Absolutely no other symptoms.

Objectively a round ulceration, the size of a two-franc piece, is found upon the anterior lip of the cervix but not touching the external os. The edges are raised and indurated, the base necrotic, drak grey in color. Faint roseola and slight papular syphiloderma scattered over body. No glandular enlargement.

After seven days of deep injections of mercury, the roseola has become more marked while the cervical lesion shows signs of healing: the edges are less high, the slough has given way to bright red color and beginning cicatrization.

About three weeks later both the primary and the secondary lesions have completely disappeared, although patient has not attended regularly to treatment.

Gelli. (Clinica Ostetrica, June, 1905, quoted by Laffont, p. 221.)

No. 38. Multipara of fifty-four, had acquired syphilis at age of thirty. Menopause at forty-eight. For the last five months, continuous though slight hemorrhage from uterus. Patient weak and anemic.

External genitals and cervix senile. Uterine body symmetrically enlarged. One small inguinal gland and a small tumor on tibia. Diagnosis between uterine cancer and tertiary uterine syphilis. Exploratory curettage. Microscopic examination of scrapings excludes carcinoma. Therefore, antiluetic treatment which is followed by good result within fifteen days. Metrorrhagia has ceased, tibial tumor disappeared, uterus and inguinal gland have become smaller, general health greatly improved.

Guillemot. (Le Courrier méd., April 14, 1907, quoted by Laffont, p. 238.)

No. 39. Woman of thirty-three, was pregnant nine times; of these one premature birth and one miscarriage. Husband

contracted syphilis five years before marriage. She has been under specific treatment for a short time. A year ago she had bloody discharge between menses, and now she has menorrhagias. Cervix deeply torn on right side, granular to touch. Uterus somewhat enlarged, otherwise normal, adnexa free. A round reddened area on cervix visible in speculum. Calomel injections and ichthyol tampons. Flow stopped three days after first injection and erosion seems improved. After two more treatments patient disappeared from view.

Author admits incompleteness of report, but believes this to be a new case of metrorrhagia of syphilitic origin.

Hoffmann. (Ztschr. f. Geb. u. Gynäk., lxix, 1911, p. 482.)

No. 40. Patient admitted to hospital with chronic sepsis subsequent to the delivery of living twins two months ago. High fever. Wassermann positive. Below urethral opening there is an ulcer with fatty, glistening surface, a smaller round ulcer at fourchette. On anterior cervical lip a tumor, size of apple, necrotic, with ulcerated surface, also waxy in appearance. On the right side an island of intact mucosa within the ulcerated area. Uterus irregular, greatly enlarged, movable, not tender. Right appendages enlarged and adherent, left adnexa and parametrium seem normal. Microscopic examination of excised piece of cervical tumor shows a syphilitic gumma.

Patient died four weeks later as the result of the chronic sepsis. At autopsy a thick layer of gummatous tissue is found, several centimeters in thickness, reaching from portio to fundus and involving the entire surface of the endometrium and penetrating deeply into the myometrium. Right tube and ovary transformed into a gummatous mass. All the retroperitoneal glands, especially around right ureter, also changed into gummata. Several gummata in liver, one in lungs. Microscopic examination made by the pathologist v. Hansemann.

Howitz. (Nord. Med. Arkiv., Stockholm, April 30, 1908, abst. in Jour. Am. Med. Assn., July 18, 1908, p. 268.)

No. 41. Patient, thirty-two years old, mother of three children, youngest aged four. Small tumor found on anterior

lip of cervix. Histologic examination of excised tumor: epithelioma. Three years later she returns apparently with recurrence of growth, but situated on the posterior cervical lip. Tumor is hard, resistent, circumscribed, and indolent. This tumor also excised, and diagnosis of epithelioma repeated. Questioning reveals history of luetic infection fifteen years ago. At that time she had received thorough specific treatment and never since had any symptoms. Although no signs of syphilis can be found at present, potassium iodide is given. Woman has since passed through another normal pregnancy. No spirochetes found in placenta. No recurrence of tumors.

Diagnosis: syphilitic tumors of cervix.

Ivens. (Jour. of Obst. and Gyn. of Brit. Emp., xiii, p. 273.)

No. 42. Woman, aged thirty-two. Mother of four children. On portio vaginalis slightly to the right and extending to both lips an ulcer size of a shilling. Its surface covered with a grayish slough, its base indurated. On wiping the surface blood oozes freely. Malignancy suggested by findings, but the unusual character of ulcer, and a coexisting gonorrhea, pointed to diagnosis of a syphilitic lesion. Small wedge excised for microscopic study shows only inflammatory changes. "The healthy epithelium ends abruptly and the surface of the ulcer consists of exudation and necrotic granulation tissue. The connective-tissue hyperemic and densely infiltrated with round cells, shows extreme cellular proliferation. Intima of vessels thickened." Five weeks later characteristic superficial ulcers develop on tonsils. Antisyphilitic treatment is given. Within three weeks the chancre disappeared and about a week later a roseolar rash occurred.

Jaworski. (Wiener klinische Wchnschr., July 20, 1911, p. 1059.)

No. 43. Woman, aged thirty-one, illegitimately pregnant four times, three miscarriages, all in third month, then a full-term child twelve years ago. Metrorrhagias for the last three years. Uterus retroverted, large, hard, slightly tender. Cervix

normal. Scar of old right parametritis. Local treatment and curettage fail. No history and no evidences of syphilis. Her lover of the past eighteen years has tabes dorsalis. Mixed treatment. Menstruation becomes regular, uterus smaller.

No. 44. Woman of thirty. Three macerated fetuses, each expelled in sixth month. Menstruation regular but followed by ill-smelling discharge. Uterus large, movable. Adnexa normal. No signs of syphilis; husband denies syphilis. Two of the placentas have been examined histologically: Edema, hypertrophy of villi, gangrene, and arteritis. She received, by mouth, a total of two grams of protojoduretum hydrargyri. The discharge disappeared for some time but returned later. The hemorrhages became less free but continued.

No. 45. Aged thirty-six. Four abortions, all in third month. Following this she had one full-term child, sixteen years ago, which suffered from a vesicular dermatitis and nasal catarrh, and died when nine months old. Menstruation at intervals of three to four weeks. Copious, ill-smelling vaginal discharge. Uterus enlarged, tubes thickened and tender, ovaries tender (salpingitis and perioöphoritis). Two years ago paresis of oculomotor nerve. Had received mixed treatment at several occasions, each course followed by an improvement both of discharge and menstrual condition. Pain in lower abdomen improved, especially "along the pelvic arteries."

No. 46. Woman of thirty-four, unmarried. For the last two or three years copious hemorrhages every two or three weeks. Uterus very small, but very hard, not tender. Adnexa normal. Injection of a 10 per cent. gelatin solution reduced the hemorrhages. Patient asserts that she has never been infected. She admitted, however, that seventeen years ago she had on one occasion had intercourse with her fiancé who shortly afterward committed suicide because he had acquired a luetic infection from another woman. Patient has no evidence of syphilis. Wassermann, however, is found positive. Mixed treatment promptly followed by objective and subjective improvement.

No. 47. Woman, aged thirty years. Infected with gonorrhea early in married life. Never pregnant. Uterus larger than normal, retroflexed, very hard, slightly tender, both adnexa involved (salpingitis and oöphoritis). Irregular menstruation, mucopurulent, ill-smelling discharge. Two years ago suffered from persistent headaches, dizziness, visual disturbances,

divergent strabismus, myosis, and a positive Romberg. When gynecological treatment did not yield satisfactory results, Wassermann was made and found positive. Mixed treatment given for next two years. After that time uterus was normal in size, all tenderness disappeared, vaginal discharge checked, and menstrual flow was reduced to only two days.

Jeanne. (Annales de Gynéc. et d'Obst., 1904, lxi, p. 497.)

No. 48. Woman of forty-nine, syphilitic for several years. An inflammatory tumor is found in pelvis and left iliac region, apparently a pyosalpinx. Operation suggested but refused by patient. Perfect cure within fifteen days under administration of iodides and mercury. Two years later three solid round tumors, size of small oranges, are discovered near the uterus, supposedly fibroids in broad ligament associated with a tubal lesion. Again an operation is refused, and, therefore, mercury injections are given. All tumors disappeared completely. Return of symptoms six months later with the same therapeutic result. The same procedure repeated two years later.

Diagnosis: tubal syphilis.

Joukowsky. (Wratch. St. Petersburg, 1904, p. 505, quoted by Laffont, p. 231.)

No. 49. Normal child, born deeply asphyxiated, died five days later after having had a persistent though slight hemorrhage from vagina for one day.

Autopsy findings: Congenital lues. In uterine fundus hemorrhagic areas.

Microscopically: Subepithelial hematomata in endometrium. Surface epithelium missing in several places, and blood escaping into the free uterine cavity. Also hemorrhagic areas around capillaries in myometrium. Veins enlarged. Arteries show endoarterial changes; several small arteries completely obliterated.

Kurz. (Journal of Obst. and Gynec. of Brit. Emp., 1913, xxiii, p. 353.)

No. 50. Woman of thirty-four, who gave birth to five children; two died in infancy. During last pregnancy, nine

years ago, she "caught a sore on vulva from husband." Six weeks after birth of this child she had an abscess in right groin which took several weeks to heal. Ever since, patient had discharge both from anus and vagina after defecation. Bowel movements at times blood-stained.

Findings: Within labia minora a mass is visible which projects outward from the lower portion of posterior vaginal wall. On each side of this mass, in front of the fourchette, there are two small ulcers. They have clear-cut edges, their bases being covered with pale, weak granulations. The depth of the ulcers is about one-quarter of an inch. The left ulcer runs obliquely upward and communicates with the rectal wall. The upper part of the vagina is healthy; the lower half is covered with small nodules and is contracted. Uterus and appendages normal.

Diagnosis: clear history of syphilis. Typical esthiomène perforating into rectum.

Laffont. (Sur la Syphilis Tertiaire de l'Utérus et des ses Annexes, Paris, 1908, p. 253.)

No. 51. Woman aged thirty-three. A miscarriage in second month, nine years ago, followed by nocturnal headaches, alopecia, general roseola, pharyngitis, etc., for which she had received specific treatment during succeeding two years. A year later another miscarriage in third month. Later gummata on right knee, scars still visible. Two years ago transitory left-sided hemiplegia. For last year menorrhagias now changing into metrorrhagias.

Findings: Uterus slightly enlarged, ovaries normal, tenderness on pressure in right fornix and posterior cul-de-sac. Cervix fairly normal in speculum. Slight cervical discharge. No definite local condition which could explain the hemorrhage. Syphilis is suspected as the real cause. Mercurial treatment is instituted, and three weeks later the hemorrhages have ceased.

Lagneau. (Traité Practique des Malad. Syphilit., Bruxelles, 1828, p. 264.)

No. 52. "Patient had cohabited several years with a man whose ill health manifested itself by frequent returns of an old

venereal disease." From time to time he received some form of mild treatment. "Almost from the beginning of this intercourse the woman perceived at the neck of the uterus a sensibility not common to her." This sensibility gradually developed into severe lancinating pain accompanied by free, irritating discharge. Three years later the patient consulted Cullerier. He found "considerable scirrhous engorgement at the neck of the uterus, which also was the seat of several ulcers with hard, perpendicular edges." He used very concentrated sudorific decoctions combined with very small doses of the deutochloride of mercury. In less than two months the neck of the uterus was restored to its natural size, the ulcers were healed and all the symptoms of the distressing disease had disappeared.

Lancereaux. (Syphilis, 1868, vol. i, p. 286.)

No. 53. Woman of thirty-three with history of constitutional syphilis ten years ago. On admission to hospital, facial hemiplegia, paralysis of external oculomotor, violent nocturnal pains in tibia, etc. Finally died.

Autopsy: No traces of scars in skin, no anomalies about bones of skull or meninges; nothing abnormal in brain.

In the pelvis adhesions between the ovary, uterus and neighboring parts. Small amount of pus in posterior cul-de-sac. Kidneys and ureters covered with a layer of pus.

One of the ovaries, enlarged in size, was the seat of a white induration, disposed in patches, the greater portion of it being manifestly diseased and adherent to the tube and neighboring organs.

Diagnosis: Second stage of fibrous thickening of the syphilitic ovary.

No. 54. In a patient of forty-three years there existed, simultaneously with osteocopic pains in the cranium, two tumors of the size of an egg, situated in the region of the ovaries, and elongated in the direction of the broad ligament.

On the assumption of a syphilitic affection potassium iodide was given. The tumors rapidly decreased in size. Twenty days later the one on left side had disappeared, "for it was no longer discoverable by palpation."

Diagnosis: ovarian syphilis.

No. 55. (Vol. ii, p. 27.)

Postmortem examination of a woman, forty-one years old, who had never menstruated. Probable diagnosis of hereditary lues is made. The ovaries are found in a rudimentary state. They do not contain any Graafian follicles. The uterus is comparatively small. (The author does not state in this connection that the condition found in the ovary is due to the assumed hereditary lues, but this case often is quoted in literature as an illustration of congenital syphilitic ovaries.)

Lancereux. (Bull. Acad. de Méd. de Paris, 1902, xlviii, p. 320.)

No. 56. Woman of twenty-six, anemic, with stricture of the rectum and hard masses in the pelvis which were diagnosed as malignant. In view of the obvious inoperability of the case, potassium iodide was given, although there was no positive history of syphilis. Disappearance of the tumors and complete restoration to health after two months.

Diagnosis: pelvic gumma.

La Torre. (Clinica ostetrica, 1904, xii, quoted by Laffont, p. 228.)

No. 57. Woman of forty with well-marked luetic manifestations. Two premature births, two miscarriages. Menorrhagias for last two years, with an occasional intermenstrual hemorrhage.

Findings: Uterus enlarged, cervix torn and swollen. Ectropium extensively ulcerated. Dense mass of scar tissue in left parametrium.

Thorough curettage of uterus and ulceration brings no relief. Menorrhagias continue and ulceration grows larger. A specific lesion is suspected and mixed treatment given. Within one year complete recovery, both general and local.

No. 58. Young woman, infected three years ago, had two miscarriages.

Findings: Cervix hard, enormously enlarged with an extensive ulceration around external os, necrotic, bleeding freely on touch.

Failure of the usual local treatment. Because carcinoma is suspected hysterectomy is proposed by another physician. Histologic examination of excised piece excludes malignancy; therefore, antiluetic treatment is instituted. Complete and permanent cure.

Lécorché. (Comptes rend. de la Soc. de Biol., 1856, p. 160, quoted by Lancereaux, vol. i, p. 287.)

No. 59. Postmortem findings in a woman who presented papular syphilis in frontal region and finally died of cachexia. In the lungs were found three masses which were regarded as tuberculous, but which Lancereaux "is tempted to look upon rather as gummy tumors."

Ovaries fibrous, only very few Graafian follicles can be seen. Cortex in its entire thickness formed by dense tissue. On surface of ovaries calcareous deposits which effervesce when touched with nitric acid.

Lee. (Lancet, July 5, 1890, p. 18.)

No. 60. Brief record of a woman who had miscarried repeatedly. Patient and husband were given mercurial treatment. A few healthy children were born, then again several miscarriages. Another specific treatment (calomel baths) is followed by birth of a healthy child. (No local findings are mentioned.)

No. 61. A syphilitic woman, mother of several children with signs of hereditary syphilis, had been treated locally for menorrhagias. Antisyphilitic treatment is followed by birth of healthy child. (No pelvic findings mentioned.)

No. 62. Woman who had been treated for a displacement of the womb is suffering at present with an "irritating eruption on the lower part of her body." Constant backache accompanied by chronic discharge. "Any pressure in the neighborhood of the womb gave pain." Mercurial treatment gave relief, all symptoms disappearing within three months. Children born later were comparatively healthy.

Diagnosis in all three cases: Syphilitic affection of the uterus.

Le Fort. (Annales de Gynéc. et d'Obst., 1904, lxi, p. 499.)

No. 63. Cachectic woman. Clinical diagnosis: Cervical carcinoma. Hysterectomy decided upon, yet doubt is felt concerning diagnosis. Consistency and color were not exactly those of cancer. Excision of wedge for microscopic examination. Found not to be a malignant growth. History revealed lues of husband and numerous abortions. Specific treatment is followed by cure.

Létulle. (Bullet. de Soc. Anatom. de Paris., 1906, lxxxi, p. 724.

No. 64. Demonstration of a uterus from a syphilitic woman who had died twenty-eight days after childbirth. The veins in the submucosa show the manifestations of a proliferating endophlebitis.

Loeb. (Zentralbl. f. innere Mediz., 1903, xxiv, p. 87.)

No. 65. The recent report of a case of gummatous pelvic cellulitis by Fournier, prompts the writer to record an observation made by him thirty-two years ago.

A man thirty years old, a few years after an infection with syphilis, presented himself with a large hard mass in right iliac region apparently arising from pelvic bones. Diagnosis of osteosarcoma was made. At postmortem gummata were discovered in liver and the tumor to the right was found to be a mass of hard infiltrated connective-tissue in which were imbedded loops of intestines. He now feels certain that this was a case of syphilitic cellulitis.

Longui. (Unpublished cases, seen in 1906, quoted by Goldenstein, p. 106.)

No. 66. Prostitute, aged twenty-three years. Enlarged, hard inguinal glands. Menstruation normal, no history of uterine trouble. Normal full-term child six years ago. No miscarriage.

Three years ago roseola and angina: secondary lues. Well for some time. Later intense pain from sciatica. For last three weeks profuse metrorrhagia.

Findings: Vulva, vagina, and uterus normal.

Diagnosis: syphilis. After five injections of bichloride of mercury both neuritic pain and metrorrhagia disappear.

No. 67. Aged twenty-four. Normal menstruation, never pregnant. Maculous syphiloderma over entire body. Impetigo syphilitica of scalp. Indolent, enlarged inguinal and epitrochlear glands. Time of infection unknown. For the last two months menstruation occurred at shortened intervals, freer, with pain in hypogastrium extending to sacrum. On vulva hard papule interpreted as remnant of initial sclerosis.

Diagnosis: Secondary syphilis. Specific treatment. Roseola and pain disappear. Menstruation regular afterward.

Madlener. (Monatschr. f. Geb. u. Gynäk., 1901, xiii, p. 526.)

No. 68. Patient, forty-one years old, had two children. Profuse purulent vaginal discharge for six months. No other complaint.

Findings: Large ulcus, almost round, covering entire anterior cervical lip, reaching into anterior fornix. Its base flat, surrounded by a sharp, irregular edge; hard, infiltrated base, bleeds easily. Anterior cervical lip thick but its shape preserved.

Diagnosis of carcinoma was made.

When patient was on table prepared for total hysterectomy doubt was felt concerning the diagnosis, because ulcer seemed too smooth for cancer, and, when tenaculum was fastened, cervix also did not seem friable enough for a malignant growth. Therefore, only a high amputation was performed. Microscopic examination showed that the lower half of the cervical wall consisted of granulation tissue. There were no giant cells recognizable nor epithelioidal cells or tubercles. Neither history nor general findings suggested lues, thus histologic findings did not determine diagnosis. Shortly afterward, however, a typical tertiary syphilitic exanthema appeared and six months later patient had a perforation of the palate.

Final diagnosis: gumma of cervix.

Meirieu. (Nouvelle Biblioth. Méd., 1823, iii, p. 69, quoted by Duparcque, Treatise on the Function and Organic Diseases of the Uterus, 1837, p. 347.)

No. 69. A pregnant woman of twenty-five with acute gonorrhea with swelling and ulcers of external genitals; improved somewhat under treatment. At parturition all treatment was discontinued. The ulcers disappeared. "The gonorrhea became thicker, glairy, and more profuse than before delivery." A year later she was emaciated and complained of pains in hypogastrium, loins, and internal parts of the thighs. Severe pain in limbs at night.

Menses irregular. Meirieu found the "vagina hot, the neck of the uterus in its natural position, soft, large, very sensitive, and ulcerated on the left side; the bottom of the ulcer was granulous; the pains caused by my fingers extended to the internal part of the thigh." Examination with the speculum: "The neck had a natural color in its healthy part; at the left side an ulcer the size of a franc piece; the bottom of it was yellow and uneven; the granulations on it appeared to be covered by a smooth membrane; the edges of the ulcer were a little elevated and red and surrounded by a circle of less bright red." The diagnosis of cancer of the cervix, made before by others, seemed confirmed. "But the pains in the bones, and the circumstances which I stated in the commencement, presented the idea of syphilis more strongly to my mind." Inunctions being refused by the patient he persuaded her to rub her legs daily with a solution of one grain of sublimate of mercury in three drams of distilled water. Fifteen days later the pains in the bones were lessened. Gradually the solution was strengthened until finally two grains of the sublimate were used daily in this form. After this treatment had been continued for three and a half months, discharge from the vagina and the ulceration of the uterus were much diminished. Six months later he found the cervix almost completely cicatrized. Two years later she was perfectly cured.

Meirowsky and Frankenstein. (Deutsche mediz. Wchnschr., 1910, xxxvi, p. 1444.)

No. 70. Woman, forty-two years old, mother of four children. At the age of thirty-six years destructive ulceration appeared

in face and over tibias. Two years later menstruation ceased. After specific treatment all ulcerative processes healed and menstruation reappeared.

No. 71. Woman, aged thirty-eight years. One confinement, one abortion. When thirty years of age, had tumors on neck, which broke down and did not heal in spite of five operations. Three years later menstruation ceased.

Diagnosis: Tertiary lues. Uterus found small, of "virginal type." Mixed treatment. All ulcers healed. Some time later patient began to complain of menstruation-like pains every four weeks, now and then accompanied by a bleeding from the nose but no return of menstrual flow at time of this report.

No. 72. Three healthy children. Luetic infection during fourth pregnancy at the age of twenty-eight. Child died at fourteen months. Soon afterward sores on thighs, tibias and in other regions persisting in spite of thorough specific treatment. After last confinement she remained amenorrheic for six years and then had an abortion in fourth month.

Diagnosis in all three cases: tertiary luetic affections of ovaries causing amenorrhea.

Meslay. (No bibliographic reference, quoted by Pothérat in Gaz. des Hôpit., 1911, lxxxiv, p. 199.)

No. 73. Woman of twenty-four. Tumor in lower abdomen discovered after normal confinement. Mass gradually increased to size of child's head. Medical treatment ineffective. Laparotomy: Tumor is adherent to anterior abdominal wall, apparently cancerous. Therefore, abdomen closed. Patient leaves bed on fourth day. Later mercurial treatment is given. Tumor disappeared.

Diagnosis made by Meslay: syphilitic tumor.

Diagnosis suggested by Pothérat: phlegmon of broad ligament.

Mollière. (of Lyon, quoted by Laffont, p. 163.)

No. 74. Young cachectic woman with "fungous ulcer of uterus." Complete cure after vigorous treatment with inunctions and potassium iodide.

Montanier et Velpeau. (Gazette des hôpit., 1862, p. 450, quoted by Lancereaux, vol. i, p. 288.)

No. 75. Woman, fifty years old. Had three children with first husband, all dead, none in twelve years of second marriage. No history of syphilis, but "thinks that her first husband had some disease of that nature." For six months she has had pain in the loins, weakness in the limbs, later more acute pain in thighs, followed by constipation and pain during defecation. Some months later a yellowish-green discharge appeared. Patient looks cachectic and is greatly emaciated.

In the roof of vagina a rather hard and somewhat nodular mass about the size of the head of a fetus of seven months, which moves freely in the pelvis, and presses upon rectum and bladder, apparently not ulcerated at any point. In the middle of it there is felt a slight hiatus which may be assumed to represent the os. In the abdomen a hard rounded body is palpated extending three fingers above the pubis. No ulceration visible in speculum.

Diagnosis: Doubtful. Velpeau, called in consultation, orders inunctions and potassium iodide. Twenty-five days later patient better, but a gummatous periostosis found on left tibia. The uterine tumor had diminished almost by one-half. The neck of the uterus was now distinguishable and gave to the finger the sensation of an almost healthy body. Antisyphilitic treatment is continued. Six weeks later uterus entirely normal to touch, no irregularities palpable, no more pain. The gumma of the leg also has disappeared.

Moraller. (Zeitschr. f. Geb. u. Gynäk., 1908, lxii, p. 159.)

No. 76. Primigravida, aged twenty-nine years, pregnant eight months. Patient began to complain of itching skin eruption five days ago. Maculopapulous exanthema covering entire body with exception of extremities.

On vaginal portion, surrounding the external os, an ulcer, almost 2 cm. in diameter, fatty, glistening, yellowish, sharp edged, encircled by a narrow ring of red inflamed mucosa. Inguinal glands slightly swollen. No palpable enlargement of cubital or cervical glands. No mucosa changes in mouth or throat.

Diagnosis: initial sclerosis on portio of pregnant woman.

Morgan. (Syphilitic gumma of uterus, 1871, quoted by Laffont, p. 166.)

No. 77. Postmortem examination of woman, aged thirty-two, whose syphilis had never been treated. Death due to cachexia. Gummata of neck and in right kidney. Identical lesions in uterus. "Uterine fundus contains a small, well-circumscribed tumor, firm, with all characteristics of a gumma."

Morisani. (Arch. di ost. e gin., 1901, No. 1, abst. in Zentralbl. f. Gynäk., 1902, p. 294.)

No. 78. Woman of forty, suffering from metrorrhagias. Clear history of syphilis, acquired eighteen years previously. Hemorrhages have existed for three years. No relief from curettage.

Findings: Uterus enlarged and hard. Multiple gland enlargements.

As a second curettage failed to bring relief vaginal hysterectomy was performed.

Microscopic examination: Far-advanced degeneration of the bloodvessels. Thickening of intima with increased amount of connective and elastic tissues, pronounced fibrous hyperplasia of adventitia, atrophy and homogeneous degeneration of media. In the smaller vessels the adventitia is affected most markedly, the process in all probability starting from this layer.

Diagnosis: angiosclerosis, result of tertiary syphilis.

Mouchet and Nicolaidi. (Gaz. des Hôpit., 1909, lxxii, p. 328.)

No. 79. A man of forty years, suffering for the second time from a gummatous pelvic cellulitis simulating cancer. Hereditary syphilis. Both times cure is obtained by the use of mercury.

Muratow. (Zentralbl. f. Gynäk., 1907, xxxi, p. 830.)

No. 80. Patient twenty-three years old, married five years. Husband was treated for syphilis shortly before marriage. Soon after marriage patient had a purulent vaginal discharge and an ulcus on vulva which soon healed under treatment. Discharge persisted. Soon afterward she had a general roseola

for which she was treated. Pregnancy starting at about that time ended prematurely in seventh month, the child dying the next day. From then on menses profuse, coming at shortened intervals.

Findings: Cervix of normal size, very hard, uterine body of normal size, hard, not tender. Adnexa probably normal, not palpable. A pulsating bloodvessel in right vaginal vault (uterine artery) tender on pressure. Broad, superficial erosion on anterior cervical lip, mucosanguineous discharge from os. Inguinal and cubital glands enlarged.

As the usual therapy so far failed, a trial was made with specific medication and continued for six weeks. Within ten days the bloody discharge had ceased and a week later menstruation appeared which lasted only five days. The tenderness of the uterine artery disappeared. A year later patient had no complaint. Genitalia were found normal on palpation.

Neisser. (No bibliographic reference given, quoted by Meyer in Deutsche med. Wchnschr., January 28, 1913, p. 169, also Ztschr. f. Geb. u. Gyn., lxxiii, 1913, p. 322.)

No. 81. A woman presented herself complaining of irregular uterine hemorrhages and vaginal discharge. Cervix found enlarged, thickened, but soft and not ulcerated. Microscopic diagnosis made on excised piece of cervix: Round-celled sarcoma. Thereupon, hysterectomy. Soon after operation, typical secondaries. Neisser concludes that the diagnosis of sarcoma has been incorrect and that in all probability a primary chancre of the cervix has existed in this case. He contends that the exact diagnosis could have been made by means of mercurial inunctions.

Nielsen. (Dermatol. Wchnschr., February 27, 1915, p. 209.)

No. 82. A woman, aged twenty-nine, with typical secondaries for the last seven or eight weeks; infection about four months ago.

Findings: To the left of middle line on anterior vaginal wall about 3 cm. below fornix, a triangular infiltration, about 2 cm. wide at base. The edge about 2 mm. wide, somewhat raised, clearly distinguishable from surrounding normal mucosa, in general showing the same color as the latter. In the centre of this depression a sharp-edged, deep ulceration (10 by 3 mm.) with dark red base surrounded by an area of smooth, yellowish-red tissue; bleeds easily. Finger and sound ascertain a well-defined infiltration. Numerous spirochetes in dark field. No enlarged glands palpable in pelvis. In right inguinal region five, in left inguinal region four indolent, sclerotic glands, size of beans. Polyadenitis axillaris, cervicalis, postmandibularis, etc. Roseola on trunk. Erosions of tongue, palate, and tonsils. Headaches. Hair falling out. No leukoderma. Wassermann + + + +. Under antisyphilitic treatment complete healing of ulcer, leaving a narrow scar, hardly visible in folds of vaginal mucosa.

Diagnosis: partially healed primary chancre in vagina.

O'Day. (New York Medical Journal, December 26, 1914, p. 1258.)

No. 83. Woman of forty-three years, examined by several surgeons, all agreeing on diagnosis of carcinoma of uterus and cervix. O'Day made the same diagnosis, pronouncing the case inoperable. Cervix was eroded, much enlarged, with an infiltration that extended well into the vault of the vagina. Seropurulent discharge with typical offensive odor of cancer. Syphilis not thought of. Patient became a Christian Scientist. Later cervix apparently broke down, patient suffering from severe hemorrhage. She failed rapidly until death seemed imminent. O'Day saw her again just one year after first examination. Patient looked cachectic, had been bedridden for eleven weeks, emaciated and suffering intensely from bedsores. He was called to relieve her from pain caused "by fever sores in her mouth." Much to his surprise he found in her mouth typical syphilitic mucous patches. A slough expelled from vagina proved to be non-malignant tissue. Wassermann strongly positive. Further investigation showed luetic infection, probably acquired two years before the discovery of the neoplasm.

"Proper treatment carefully applied has restored this woman to perfect health, and much as I would like to deny it, in that particular neighborhood I am regarded as a regular wizard in the treatment of inoperable cancers."

Oui. (Sémaine Gynéc., 1913, xviii, p. 325.)

No. 84. Primipara of twenty-two years. Delivered prematurely by means of vaginal Cesarean section on account of rigidity of cervix. Patient was in secondary stage of syphilis and died three days after operation; the child died fifty-four days after birth.

Autopsy: Cause of death was renal and hepatic insufficiency. Section through cervix shows chronic sclerotic inflammation, in places hyaline degeneration. A small fibrous nodule on cervix.

Diagnosis not certain. Ordinary chronic inflammation could hardly lead to such rigidity. On the other hand the early stage of the infection argues against syphilitic sclerosis. If the small nodule represents all that is left of a primary chancre on the cervix, it seems unlikely that it would have caused so extensive an induration of the cervical canal.

Ozenne. (Sémaine Gynéc., 1898, p. 195, quoted by Laffont, p. 171.)

No. 85. Woman of thirty-two without any evidences of syphilis, suffering from metrorrhagias which had not been benefited by various forms of treatment. Almost continuous loss of blood. Patient has headaches and intermittent pain in both iliac fossæ.

Findings: Uterus slightly enlarged, but without any apparent lesions, movable, not tender. Slight hemorrhage. Length of uterine cavity normal. Cul-de-sac free. On abdominal palpation there is in each iliac fossa a tender, round, well-defined tumor of the size of a small orange, resembling an enlarged, sclerocystic ovary. A year later bilateral oöphorectomy is performed.

Specimen: Solid tumors, size of small egg, arising from

sclerotic ovaries. On section, tumors found hard, resembling fibrous tissue. No microscopic examination made. Subsequent to operation typical nervous symptoms of artificial menopause not yielding to any kind of treatment.

Diagnosis: Tertiary syphilis of ovaries. Diagnosis is based partly on the headaches as symptoms, partly on the fact that the patient improved physically after administration of mercury, potassium iodide and iron, quinine with strychnine. And yet, these headaches continued for two more years and disappeared finally after more potassium iodide had been given.

No. 86. Woman, aged thirty-five, without any history or manifestations of syphilis, suffering from metrorrhagias which are not yielding to medical treatment. Temporary relief after curettage. The only pathologic findings consist in enlargement and tenderness of both ovaries.

The diagnosis of tertiary syphilis of the ovaries is made chiefly by the exclusion of all palpable local anomalies, and is also based on the fact that patient's first baby died a few months after birth from an unknown cause, and that the second child, born prematurely after a hot vaginal douche, died within twenty-four hours. Husband is suspected of having had a hard chancre before marriage. Antisyphilitic and tonic treatment, given intermittently for one year, result finally in normal menstruation. Ovaries are found reduced in size but still larger than normal. The author concluded that this is an indisputable case of "sclerogummatous" ovaries.

No. 87. (Bull. de la Soc. Méd. du IX. arrondissem, 1901, xviii, p. 195, quoted by Laffont, p. 190.)

Woman of forty-two, always well. Husband had a chancre in his younger years. Three births, last nineteen years ago. Two children died soon after birth with "eruptions;" the third, one year old, from meningitis. About that time patient suffered from severe headaches. When first seen, patient had a hemorrhage for the last three weeks, which started with the last regular menstruation. Usual duration of menses four or five days. Pain in lower abdomen for last week. Temperature normal; blood not malodorous. Miscarriage can be excluded. Uterus is found not enlarged, slightly tender; adnexa normal.

Dilatation and digital exploration prove absence of submucous fibroids, polyp, or neoplasm. Curettage. Only small amount of tissue obtained. Hemorrhage continues. In view of above history syphilis is suspected. After a course of inunctions rapid and permanent cure.

No. 88. (La Syphilis, 1904, p. 217, quoted by Laffont, p. 200.)

Woman of twenty-nine, had a miscarriage soon after marriage. History of husband suspicious. Since abortion general health of patient impaired, but no definite symptoms. Menses, heretofore regular, became less frequent and lasted twice as long, eight to ten days. In intermenstrual time occasionally bloody discharge. During last year uterine hemorrhages twice a month, the last one continuing for several weeks. Patient weak, pale, emaciated. General examination negative. Both ovaries enlarged, the left somewhat tender. Uterus of normal size, hard, in movable retroversion. Cervix soft, os slightly gaping. Slight hemorrhage. Curettage brings relief for three months. Then return of metrorrhagias; persistent bloody discharge.

Now the diagnosis of "latent syphilis" is made. Mercury by mouth and inunctions followed by cure after three months. Menses again normal, general health good, gain in weight. Ovaries not as large as before, but still above normal size.

No. 89. (No bibliographic reference given, quoted by Laffont, p. 215.)

Woman of forty-three. First child healthy. Second child presents typical signs of congenital lues for which it has been kept constantly under specific treatment. In the mother syphilis manifested itself a few months after second confinement in the form of mucous patches, condylomata at vulva and anus, general eruptions. Antiluetic treatment continued successfully for five years.

During next ten years no treatment. General health fair. During last few months menstrual flow prolonged, of late typical menorrhagias, the free interval reduced to one week only.

General examination negative. Uterus greatly enlarged and tender. Enlargement due to thickening of walls, uterine cavity being of normal length. Cervix normal. No fibroids. Speculum examination negative. Tubes and ovaries not palpable.

Neoplasm, fibroid, subinvolution, malaria, and even syphilis are excluded and diagnosis made of preclimacteric metrorrhagia. Neither medicinal nor local treatment bring relief. Therefore, trial with inunctions. After the seventh rub improvement becomes noticeable. After thirty rubs, extending over several months, menses fairly regular, uterus smaller, no longer sensitive. After a lapse of nine months, no specific manifestations but general lassitude and weakness, ascribed by Ozenne to specific diathesis and general arterial degeneration, for which mixed treatment combined with tonics is ordered.

No. 90. (Gazette des hôpitaux, 1909, lxxxii, p. 328.)

Woman of thirty-five. Had two miscarriages. Metrorrhagias for last ten months. A fungous ulceration of cervix is found with induration of surrounding tissue. Cachexia.

Diagnosis: inoperable carcinoma.

Palliative treatment. Patient finally died several months later. The next year, the patient's husband appears with marked evidences of lues. Retrospectively Ozenne now speculates: Lues of husband not cured, two miscarriages of patient, and appearance of the cervical ulcer which was not very characteristic of cancer render a diagnosis of syphilitic ulceration of the cervix more probable. Specific treatment might have saved the patient.

Ozenne and Duroeux. (Ann. des mal. vénér., 1912, vii, p. 491.)

No. 91. Girl of twenty-two with prolapse of uterus. The cervix appears in the vulva. The anterior lip of the cervix bears an ulcer the size of a franc piece. The shape is slightly oval, the edges are level with the rest of the mucosa and do not reach the external os. The ulcer is indolent and is surrounded by a thin dark-red line. The base is smooth, secretes very little, and is covered with a thin whitish film. The lesion is of the consistency of wood; the entire anterior lip is infiltrated (edematous?).

The scanty secretion of the ulcer contains an abundance of typical spirochetæ in the ultramicroscope.

Secondaries have not yet appeared in the inguinal glands, the epidermis or mucous membranes.

Nineteen days after mercurial treatment has been instituted, the ulceration has healed; the chancre consists of a whitish scar; the induration is still plainly perceptible.

Two days later even this induration has vanished, and the cervical lip has resumed its normal consistency. Not even a scar denotes the presence of the former ulceration.

Petit. (Sémaine Gynéc., 1901, p. 20, quoted by Barthélemy, p. 756.)

No. 92. Very stout woman with pronounced symptoms of tertiary lues. Persistent metrorrhagias. Two curettages bring no relief. Small uterus. No gross lesions in genital sphere. Specific treatment did not yield any result "partly because not administered vigorously enough, partly because the disease was too far advanced."

Hysterectomy proposed but refused by the patient.

Pichévin. (Sém. Gynéc., February 21, 1905, quoted by Laffont, p. 224.)

No. 93. Woman of twenty-eight, with abundant but regular menstruation, acquired lues eight years ago. Since that time she had seven miscarriages and one stillbirth.

Cervix conical, elongated. Anterior vaginal wall the seat of a recent inflammatory process which continues over anterior surface of cervix. The latter is very hard throughout and transformed into a "fibrous block." Uterus equally hard without any enlargement or irregularity.

Probable diagnosis: specific sclerotic condition of uterus.

Pinard. (Annales de Gynéc. et d'Obst., 1904, lxi, p. 497).

No. 94. A periuterine tumor of obscure origin. Patient's first husband was a syphilitic. Under specific treatment the tumor disappeared. In this case a peculiar puffy condition ("empâtement") of the vagina was ascertained which in Pinard's belief is pathognostic for uterine syphilis for he had observed

this same condition in two other cases which proved to be luetic, while in a third, in which this puffiness was absent, syphilis could definitely be excluded.

Pinkuss. (Zeitschr. f. Geb. u. Gyn., 1906, lvii, p. 289.)

No. 95. A persistent uterine hemorrhage, in a girl of twenty-two, with marked stigma of hysteria, led to a gynecologic examination which revealed the following findings: Upon the posterior lip of the cervix there was a whitish, glistening area resembling the picture of mucous patches or psoriasis linguæ. Upon the anterior lip there was a defect which looked like a fresh traumatism caused by a volsellum. This apparent wound was watched almost daily during the succeeding seven weeks by Pinkuss, who saw it develop into a large ulceration of a yellowish, glistening color, with well defined contours and raised edges. It occupied the right half of the vaginal portion in the shape of a crescent. Bleeding occurred repeatedly in the periphery of the ulcer. The uterine bleeding persisted throughout the time of observation. Now and then the picture showed slight changes. The ulcer receded from the right side and grew toward the left, but later developed again toward the original location. In the upper extremity of the affected area there appeared a sharply circumscribed defect, of about the size of a small pea, which showed great resemblance to an ulcerated condyloma latum, but after a time this, too, became enveloped in the general yellowish-lardy discoloration of the ulceration. Spirochetes were not found.

Tuberculosis and carcinoma could be excluded; moreover, the microscopic examination of an excised piece showed the absence of malignancy. The absence of inguinal adenopathy spoke against soft chancre; and a primary hard chancre seemed improbable because there was at no time any induration. On the contrary, the softness of the tissues was outspoken. Secondary manifestations which should have occurred within the seven weeks of clinical observation, had the lesion been a primary one, were lacking, and an ophthalmologist who had treated the patient previously, had found in her a luetic eye lesion. Pinkuss, therefore, concluded that this ulcus was a secondary syphilitic manifestation.

Pollaillon. (Maladies des Femmes, Paris, 1901, p. 524, quoted by Pichévin, Gaz. des Hôpitaux, 1905, p. 90.)

No. 96. Woman of twenty-seven without a history of syphilis. Full term child eight years ago. One year later a miscarriage in third month followed by pelvoperitonitis. Menstruation then became irregular and painful. Uterus descended, slightly enlarged, tender. Above left fornix a hard, tender tumor, size of hen's egg. On right side swelling and tenderness less pronounced.

Diagnosis: Bilateral subacute salpingo-oöphoritis. The use of mercury and potassium iodide within three months led to cure of anomaly on right side and improvement on left. Three years later a miscarriage, followed by metrorrhagia lasting five weeks. Both uterine appendages found in good condition.

Final diagnosis: syphilitic salpingo-oöphoritis.

Porosz. (Pester mediz. chirurg. Presse, 1911, xlvii, p. 174.)

No. 97. A woman of twenty-six, who had one premature birth and one abortion, is suffering from excessive menorrhagias for last seven years. Husband is syphilitic. After administration of mercury and potassium iodide great improvement lasting for six months at time of report. (No gynecological examination, no Wassermann made.)

C. A. L. Reed. (Diseases of Women, 1913, p. 355.)

No. 98. "I have removed a gummatous tumor from the broad ligament as large as a man's fist." (No further information given.)

Robineau. (Annales de Gynéc. et d'Obst., 1904, lxi, p. 498.)

No. 99. Woman of thirty-six, greatly weakened by menorrhagias. Infected with syphilis eight years ago. Three abortions. Old scars on both legs. Usual treatment has been ineffective.

Hemorrhages last fifteen days. Uterus large, hard. Large, indolent inguinal glands.

Diagnosis: Fibroid. Operation advised. In meantime, to improve general condition, antiluetic treatment given. Three months later marked general improvement. Hemorrhages did not return within the next two years, uterus smaller.

No. 100. Woman of forty-five. Had two children. Contracted syphilis fifteen years previously. Treated for one year and considered cured. Continuous bloody discharge affecting her general condition. Uterus, size of fist, irregular in outline, suggesting carcinoma of uterine body. Hard infiltration of both broad ligaments. Curettage gives no result. Usual treatment ineffective. Operation refused. Specific treatment yields perfect result within two months.

Rollin. (Unpublished case quoted by Goldenstein, p. 115.)

No. 101. Aged thirty-nine. Contracted syphilis seven years ago. Menstruation always regular. Now has uterine hemorrhage, which began a week after last normal menstruation. Uterus hard, large, not tender. No miscarriage. In view of history, specific treatment. After sixty days menstruation again regular. Author is not willing to assert that the treatment is responsible for the return of normal menstrual conditions.

Rostaine and Druelle. (Arch. gén. de méd., December 15, 1903, p. 3152, quoted by Thibierge, p. 122.)

No. 102. Patient had no history of luetic infection; at no time had there been an eruption or vaginal ulceration. Leucorrhea for several months. Treated for endocervicitis without result. Was told a month later that she had a malignant growth of cervix. A proliferating mass was removed from cervix. A few days later a papulosquamous eruption on neck and face. Three weeks later cervical metritis with ulceration on anterior lip. This ulcer represented all the characteristics of a luetic chancre: elevated, indurated, dark red color, not bleeding, no inguinal gland enlargement, no vulvar lesions, no scars. Two weeks later cervical chancre healed, only erosion remaining. Six weeks later cervix normal.

Saguet. (Union Méd. de Nord-Est., 1899, p. 23, quoted by Laffont, p. 178.)

No. 103. Woman of thirty-four. History of eight pregnancies: two miscarriages, two living and healthy children, three children dead within first three months, a macerated fetus four months ago. Later menorrhagia, followed by metrorrhagia, now bleeding freely. No pain.

Findings: Uterus of normal size, not tender, adnexa normal. Os not open. Uterus firm. Saguet excludes inflammatory process or newgrowth. The high mortality of her children and the macerated fetus suggest a luetic infection. Further inquiry reveals that patient eighteen years ago had an ulceration on vulva followed by sore throat for which she received treatment at that time. Antiluetic therapy yields prompt result. Four weeks later a free menstruation which is again the starting point of a metrorrhagia. Another course of specific treatment results in restoration of normal menstrual conditions.

Schaeffer. (Monatschrift f. Geburtsh. u. Gynäk., 1912, xxxv, p. 343.)

No. 104. A woman of forty-one, who aborted several times, was laparotomized for a supposed general carcinosis of the peritoneum. She now sought relief from a number of fistulas which had resulted from the operation. The very thin abdominal walls permitted exact palpation of numerous small nodules and lumps; while none were palpable in posterior cul-de-sac. Large nodular ovaries had been removed during the previous operation and had been diagnosed as carcinomatous. No evidences of tuberculosis. After two unsuccessful attempts to close the fistulas surgically, salvarsan is given, because it had been ascertained that her husband had lues. The fistulas healed and a few months later the nodules in abdomen were no longer palpable.

Implantation of a malignant growth during the operation, peritoneal tuberculosis, benign papilloma could be excluded in the light of later developments. *Ex juvantibus et per exclusionem*, a diagnosis of gummatous and lymphadenitic masses in the train of visceral syphilis seemed most plausible. "The nodular enlargement of the ovaries probably also was due to gummatous growths in these organs."

Shillitoe (in Power and Murphy, System of Syphilis, second edition, London, 1914, vol. i, p. 239).

No. 105. Aged twenty-one, single. History of vaginal discharge for last three weeks. Left labium minus edematous, the inguinal glands slightly enlarged. On the anterior cervical lip a rounded, smooth, very slightly convex, dark, purple-red chancre, which bled easily and looked like an enlarged papule. About two weeks later the chancre was undergoing resolution; it had lost its deep purple tint, it was a lighter and brighter red, and was flattening.

No. 106. Aged twenty-six. Delivered fourteen weeks ago of a premature eight months child who lived three days. Rash had disappeared before confinement but afterward had broken out afresh. On cervix uteri two primary lesions still visible, looking like large, dully red, oval, convex papules, one on each lip of cervix, partly surrounding external os.

Skutul. (Russian Journal of Obst. and Gynec., 1911, abst. in Zentralbl. f. Gynäk., 1912, xxxvi, p. 1781.)

No. 107. Woman, who has passed through eleven pregnancies, has extensive papular syphilis. On both cervical lips sharply circumscribed, eroded ulcers, crescentic, dark red, glistening, with smooth surface. These disappeared promptly under specific treatment.

Diagnosis: primary sclerosis on cervix.

Spinelli. (Archiv. Ital. di Ginec. Napoli, 1900, p. 571, quoted by Laffont, p. 182.)

No. 108. Woman of fifty-five, sent to hospital with diagnosis of carcinoma of uterine body. Had six confinements, five full-term, one premature. Contracted syphilis at age of forty-one, followed by gummata in various parts of body. After nine years of amenorrhea a serous discharge from vagina with foul odor, at first intermittent, later persistent followed by metrorrhagia.

Findings: Uterine body slightly enlarged, of fibrous consistency, anteverted, movable, not tender. Introduction of sound

reveals rugged, thickened endometrium. This exploration not followed by bleeding. Specific treatment yields good and lasting result.

No. 109. Multipara, fifty-seven years old. Menopause four years ago. Seven confinements at full term, one premature in eighth month. At thirty-six contracted syphilitic infection of nipples from her child which in turn had been infected by a wet-nurse. Specific treatment for only one year. Following an intercourse, had a hemorrhage, since then alternating metrorrhagias and foul vaginal discharge. Is failing rapidly. No definite pain. Ulcer of cervix. Uterus immobilized.

Diagnosis: Inoperable cervical carcinoma. Spinelli saw her one month later and found on posterior vaginal wall two hard nodules size of hazelnut. Below posterior cervical lip a hard infiltration with a deep, sharp-edged ulceration. Cervix immovable, tightly fastened to posterior vaginal wall. Uterine body small, atrophic. No hemorrhage subsequent to examination.

Diagnosis: Inoperable carcinoma of cervix and vagina (with mental reservation of a possible luetic infection).

In view of this possibility a trial with specific treatment seemed justifiable. After one month there was a decided improvement in infiltration. Portion of ulcer excised for examination shows granulation tissue with numerous degenerated gummata. Mixed treatment is continued. Two months later vagina is found distorted by a mass of scar tissue. Several months later cerebral syphilis with hemiplegia.

No. 110. Multipara, aged thirty-eight years. Curetted for hemorrhagic endometritis. Microscopic examination: Slight glandular hyperplasia. Husband has syphilis and has been under treatment. Patient received specific treatment during first pregnancy and carried to full term. Child died a few days after birth. Two other full-term pregnancies followed by two abortions. There ensued menorrhagias which continued for next two years in spite of treatment.

Findings: Uterus considerably enlarged, anteverted, descended, congested. Adnexa palpable, not tender. Curettage followed by improvement for three months. Since then menorrhagias have gradually changed to metrorrhagias. Ergot and local astringents give no relief. Trial with mixed treatment. Perfect result. Menstruation again becomes regular, though remaining free.

No. 111. Multipara, aged thirty-five. At seventeen infected by husband. Five premature labors at six months. At thirty-two specific treatment for ulcerative processes in various parts of the body. During next three years menorrhagias and metrorrhagias, hemorrhages being started by the slightest exertion.

Findings: Uterus large, anteverted, cervix normal but of hard consistency. Intra-uterine sound reveals friability of endometrium. Adnexa palpable, not tender.

Curettage for hemorrhagic endometritis. Microscopic examination of scrapings negative. Good result for four months; then return of metrorrhagias. Spinelli suggested hysterectomy but on repeated vaginal examination small tumor was palpated in posterior cul-de-sac which De Amici diagnosed as gumma in fornix of vaginal wall. Antiluetic treatment is followed by success. Menstruation becomes normal, but blood continues to be black and ill-smelling.

No. 112. Woman of thirty-nine. Left ovarian cyst removed two years ago. Infected by husband with syphilis soon after marriage. Now bleeding for four weeks, two years after the operation. Uterus small, anteverted, adnexa normal. Mixed treatment. A month later normal menstruation.

No. 113. Woman aged fifty-eight. Acquired syphilis two years after marriage. One full-term child before infection, followed by seven miscarriages within fifteen years. Menopause at forty-four.

Sick for last eight months. At first ill-smelling discharge, then irregular hemorrhages at intervals of eight to fifteen days. No senile atrophy of genitals, adnexa free. Small shreds of mucosa removed by curettage. Mixed treatment followed by normal conditions for six months, when a physical exertion brought on another hemorrhage. Again a course of mixed treatment, after which patient remains well.

No. 114. Woman fifty-nine years old. Syphilis immediately after marriage. Great numbers of miscarriages. Menopause at forty-seven. A year later bloody vaginal discharge at long intervals. Somewhat later hemorrhages alternating with serous, foul discharge. Cachexia.

Findings: Small hard uterus with normal adnexa Sound exploration of uterus negative. Mixed treatment is followed by perfect health. Later again sanguinoserous discharge. Gynecologic examination negative. Another course of mixed treatment ordered.

No. 115. Woman of fifty-seven. Syphilis at thirty-nine. Five normal pregnancies before infection. Menopause at forty-three. For last two years foul discharge. In last seven months slight bloody discharge alternating with profuse hemorrhage. Pronounced cachexia. Cervix and uterus markedly atrophic. Mixed treatment successful.

No. 116. Aged sixty-three. Syphilitic history not clear. Loss of hair is the only suggestive evidence. Menopause at forty-five. Now slight bloody discharge. Cachexia.

Findings: Cervix atrophic, uterine body slightly enlarged, adnexa free. Intra-uterine exploration with sound negative. Mixed treatment. Hemorrhage ceases; reappears a few months later but again yields to specific treatment.

Thibierge. (Annales de Dermatol., 1904, v, p. 113.)

No. 117. Girl of eighteen. Perivulvar and perianal vegetations are treated locally in usual manner. Accidentally a deep ulcer is found occupying the entire enlarged cervix. Ulcer not granulating, covered with a thick, yellowish-brown pseudomembrane which here and there is defective. When wiped off it reveals the dark brown color of the base. Very little bleeding but intense pain on manipulation. Inguinal glands normal, no roseola.

Ulcer seems to be a soft chancre. However, slight induration of base creates suspicion. Inoculation of secretion from ulcer made into skin of abdomen remains without result. Later roseola over entire body. In less than a month ulcer has changed into a reddened scar.

Diagnosis: Atypical primary sclerosis of cervix.

No. 118. Aged thirty-six, one miscarriage, two forceps extractions at full-term. Copious vaginal discharge of long standing. After very long interval one cohabitation seven weeks ago. Four weeks ago began to have profuse vaginal discharge, and a few days later noticed ulceration on right small labium. Soon afterward a surgeon made the diagnosis of syphilitic chancre on right small labium and cervical carcinoma, and asked Thibierge to treat the syphilis and then to refer the patient back to him for hysterectomy.

Diagnosis of labial sclerosis readily confirmed. As to cervical lesion: vaginal discharge free, serous, whitish, no blood, no bad

odor, had apparently started about the time of the appearance of the chancre. These points aroused the suspicion of Thibierge. Examination through speculum: Cervix enlarged, torn bilaterally, more deeply on right side; anterior lip hypertrophic. On the latter an ulceration, situated just above edge of os, apparently extending into cervical canal. It is rather well defined, round, about 3 cm. in diameter, deep, with uneven base, covered with grayish coating, almost diphtheritic in appearance. The latter easily wiped off, and where it is missing, the ulcer shows the dark red color of raw flesh.

On posterior lip an ulcer behind external os more shallow, otherwise resembling that on anterior lip. Adjoining portion of cervix dark red. The entire cervix nodular thus simulating an infiltrating epithelioma. Cervix very firm, especially in anterior lip which is almost cartilagenous. It is elastic rather than woody to the touch. Cervix quite freely movable, fornices normal. Cervical discharge thin. No tenderness anywhere in pelvis. Indurated, enlarged, indolent glands in inguinal region, larger on left side. No cutaneous eruptions, no mucous patches, no cervical gland swelling. Vaginal douches were given. The cervical lesion changed little at first except that the surface becomes cleaner and more even, but soon a tendency toward reparation appeared. A week later surface of ulcer clean, posterior erosion not much changed, but anterior one now looked more like a typical primary sclerosis; its edge sharp, while the induration was less pronounced; discharge diminished but not changed in character. A few roseola spots appeared on thighs. Improvement of cervix continued. Nine days later cervix in such condition that it no longer suggested an epithelioma. The ulcer on anterior lip was shallow, smooth, scarcely secreting, looking like a syphilitic chancre in process of healing. Posterior ulcer practically healed. Discharge almost checked. Chancre on labium healing normally. Roseola has, meanwhile, extended to trunk.

Diagnosis: Double syphilitic primary chancre on cervix, atypical in appearance.

Tripaut. (Sém. Méd., May 11, 1895, quoted by Barthélemy.)

No. 119. Postmortem hemorrhage treated unsuccessfully by rest in bed, hot douches, three curettages, and uterine drain-

age. Hemorrhages continue. Tripaut thought of necessity of vaginal hysterectomy, when he learned that patient had had a syphilitic infection nine years ago. Although there were at present no evidences of such an infection, antiluetic treatment was instituted. After ten days patient was much improved. Hemorrhages ceased after six weeks.

Verchère. (Annales de Dermatol., 1895, vi, p. 1005.)

No. 120. Prostitute, twenty-six years old, with perforation of soft palate. Two ulcerations are found in vagina, one above middle of left vaginal wall, about the size of a small hazelnut, the other as large as lentil, in left fornix at the base of the cervix. Both ulcers round, well marked borders which in some places show a bright red line of demarcation. Base is even, covered with pus-like substance. Edges not indurated. Not painful. The flatness of the ulcers, the absence of a "punched-out" appearance, the grayish color of the base, excluded the diagnosis of soft chancre, in spite of the multiplicity of the lesions. To settle all doubt, pus from ulcer was inoculated into abdominal skin without result.

Mixed treatment is given and within a few days ulcers heal completely without leaving any trace or induration.

Diagnosis: Gumma of vagina.

No. 121. (Le Bullet. Médic., 1904, p. 399, quoted by Laffont, p. 231.)

Woman of thirty-five who had two miscarriages. Suffering from uncontrollable hemorrhages. Curettage gives no result. One month later patient died from a fulminant hemorrhage.

No. 122. (Ibidem.)

Girl of sixteen with secondary syphilis. Uterine hemorrhages of unknown cause. Tamponade, curettage. Five days later death from hemorrhage.

Autopsy: No lesions in uterus or ovaries.

L. Wagon. (Amenorrhea of Secondary Syphilis, Thèse de Paris, 1912.)

No. 123. Girl of nineteen. Menstruation regular since the age of fourteen. Acquired lues in September, 1908, followed

by glandular enlargement, mucous patches, roseola. Last menstruation November 18, 1908. Missed in December, 1908, and January, 1909. Patient believes herself pregnant. Yet, uterus small, breasts empty, vulva not discolored or softened. Marked general anemia. Normal menses in February and March. Suppression of menses in April; patient again thinks of pregnancy, which, however, is excluded on examination. A few drops of blood in June. Normal menstruation July until November. Amenorrhea in December. Patient insists on her belief of being pregnant, and has an abortion performed in January (or rather an unsuccessful attempt at it). Amenorrhea persists until March, when the uterus is again found small. Reappearance of menses in April. Misses in May. Examination in July actually reveals pregnancy.

Mucous patches have not disappeared in spite of constant and intensive treatment.

No. 124. Girl of eighteen and a half years. Menses first at twelve and a half years; always regular. Primary sore on vulva in March, 1908, secondaries in May, 1908. Last menstruation May 25, 1908. Patient undergoes unsuccessful attempt at abortion. September 6 and 28, examinations show no signs of pregnancy.

No. 125. Girl of twenty-three, menstruates regularly since the age of thirteen. Primary sore on lower lip in September, 1908, secondaries in October. Last menses November 12. Three months later examination, not pregnant.

No. 126. Prostitute of twenty. Nullipara. Menstruation regular since the age of thirteen. First coition at sixteen. Date of infection unknown. Secondaries since July, 1908. Last menses August 15, 1908. Four and one-half months later no pregnancy on examination.

No. 127. Married woman of twenty-one. Regular menses since the age of thirteen. One healthy child at seventeen. Extraconjugally infected July 14, 1910. Primary on left labium majus in August. Secondaries in September. Last menstruation September 15, 1910. Three and a half months later examination, not pregnant.

No. 128. Girl of seventeen. Regular menstruation since age of fourteen. Primary in fourchette, July, 1909. Secondaries in September. Last menstruation November 2, 1909. March 14, 1910 examination, not pregnant.

No. 129. Woman of twenty-two. Regular menses since

twelve. One healthy child. Infected by husband in October, 1909. Last menses November 12, 1909. Examination February 25, 1910: Numerous vulvar patches, inguinal glands, roseola. Not pregnant.

No. 130. Girl of fifteen. Menses regular since eleven and a half years. Infected June 5, 1909. Primary unnoticed. Secondaries since August 3, 1909. Last menses August 8. Examined October 28 and again November 15: Pregnancy excluded.

No. 131. Woman of twenty-two, menses regular since thirteen and a half years. Primary on right major lip in July, 1910. Under treatment for secondaries since August 10, 1910. Last menses September 12. Examination in January, 1911, excludes pregnancy.

Wassilieff. (Journal de Méd., Paris, 1904, xvi, p. 284.)

No. 132. Woman of forty, one living child nineteen years ago. No miscarriage. Previous health good. Fifteen years ago she had an "eczema" which disappeared after two months. It was found later that this eczema coincided in time with a syphilitic infection of the husband. She was well for almost fifteen years. Then she noticed slight indefinite pain in the right lower abdomen which, at first intermittent, became more intense and more continuous during the following months and finally extended to the left side as well. At times the pain took on the character of paroxysms and occurred most frequently at night so as to disturb her sleep. Simultaneously the menses, hitherto normal, changed their character and became very frequent and profuse as well as prolonged. At no time was there a sign of peritonitis.

Examination revealed a normal uterus; movements of uterus slightly sensitive. Intense pain produced by touching the lateral fornices and the lateral walls of the vagina. Both tubes hard, enlarged to about the size of a finger, tender to touch but not nearly as painful as the slightest touch upon the vaginal walls. Both ovaries slightly enlarged. Rest in bed and hot vaginal douches brought no relief and patient insisted upon operation. Laparotomy. No adhesions. Both tubes enlarged as described above, and of a deep indigo color. Bilateral salpingectomy.

Operation followed only by very slightly relief. Nocturnal

pain still present, though less pronounced. Intense painfulness upon touching the fornices or pressing upon the course of the femoral, epigastric, uterine, and vaginal arteries. Also return of menorrhagias.

In view of the peculiar color of the tubes and the history of syphilis in the husband obtained at this date the diagnosis of lues is made. Specific treatment completely cured patient within three weeks.

No. 133. Woman of thirty-eight. Previous health good save frequent attacks of sore throat soon after marriage. Husband's history negative. Two children, one stillborn, the other puny, and two miscarriages. Suffering for the last six months with dull, intermittent pain in lower abdomen, first in left, later in right side. Menses increasing in quantity, duration, and frequency. On examination, tender pressure points are discovered at the external inguinal ring and along the course of the femoral and epigastric arteries. Bimanually, uterus normal, tubes tender, hard, size of lead-pencils. Posterior fornix free, lateral fornices painful to touch. Patient has been in bed for two months and treated unsuccessfully by conservative methods; she now desires operation. Laparotomy reveals right tube free, of indigo-blue color; left tube adherent, white, hard, rigid, straight. Right tube left in place, left tube removed, and antiluetic treatment instituted fifteen days after operation.

Result: After one month the pain in right side, which had persisted after operation, disappeared, while in the left, where the tube had been removed, pain persisted, although greatly reduced. Pressure pain along the arteries mentioned disappeared. Menses reappeared normally after two months, while dull, intermittent pain in left side remained.

Microscopic examination of removed tube showed total sclerosis of the tubal wall and intense peri-arteritis of the vessels of the mesosalpinx.

No. 134. Woman of thirty-eight had had several miscarriages twelve years previously. At that time also frequent attacks of pharyngitis and severe nocturnal headaches; furthermore, loss of hair and ulcerations about the vulva. For the last three years intermittent, short attacks of pain in lower abdomen, increasing in intensity, and associated with frequency of menstruation. Of late the pain is somewhat diminished but is almost continuous and worse at night. Loss of appetite and weight,

and in last three months also polyuria and polydypsia with sugar in urine. Examination reveals pain on pressure along the course of the arteries of the lower abdomen. This pain is particularly pronounced on pressure upon the arteries of the inside of the pelvis; the vaginal arteries are plainly palpable. Uterus retroflexed, otherwise without abnormality. Ovaries and tubes palpated; the latter small and hard, also painful to touch.

In view of history and findings, syphilis is diagnosed and specific treatment administered for six weeks without any improvement. Therefore vaginal hysterectomy. Both tubes reddish-gray in color, hard and resembling enlarged vasa deferentia. Both ovaries small, hard, with small follicular cysts.

Patient improved but still has slight pain at menstrual dates.

Epicrisis: Sclerosed form of salpingitis which resists specific treatment.

No. 135. Woman of thirty-four, infected sixteen years previously, has repeatedly been under specific treatment. In last two years pain first in right lower abdomen, more recently also in left side. This pain, at first intermittent, has increased gradually both in intensity and duration so as to be almost continuous, but always most severe at night. Menses more frequent and copious, and of late also intermenstrual discharge of blood. The epigastric, femoral, uterine, and vaginal arteries are painful to touch. Tubes small, hard, and sensitive.

Antiluetic treatment yields marked improvement in three weeks and complete cure in two months.

No. 136. Woman of thirty. Two miscarriages. General symptoms of syphilis six years ago. Intermittent pain in right lower abdomen, particularly severe at night. Five months later similar pain in left side. Menses more profuse, and frequent, finally excessive.

Tubes size of finger, painful, normal shape. Arteries painful to touch. Laparotomy: Tubes bluish in color, the right tube is adherent and is extirpated. Ten days after operation, appearance of nodule, size of hazelnut to right of scar, breaks open ten days later and discharges thick, pale pus. Walls of cavity purple in color, edges thin and frayed.

Pain in both sides of lower abdomen and pain along arteries on pressure remained. Specific treatment was now instituted; the cavity, presumably a gumma, healed after three weeks, and the pain disappeared.

Wegscheider. (Ztschr. f. Geb. u. Gynäk., 1913, lxxiii, p. 330.)

No. 137. Woman came to dermatologic clinic with a typical luetic lesion on internal genitalia, also suffered from metrorrhagias. She received specific treatment; the uterus and a cervical erosion were curetted. From scrapings the microscopic diagnosis of cervical syphilis was made. Five months later the patient appeared in the gynecological clinic with a typical inoperable cervical carcinoma from which she died a few months later. Another examination of the curettings showed distinct manifestations of malignancy, overlooked or wrongly interpreted at first examination.

No. 138. A woman of forty-seven. On anterior cervical lip of cervix hard cauliflower growth, bleeding very easily, manifestly malignant. Excised piece on microscopic examination found to be either sarcoma or carcinoma (diagnosis confirmed by Carl Ruge). Two weeks later the erosion on cervix was found almost healed; at the same time a peculiar skin affection was discovered on left thigh. A dermatologist made the diagnosis of tertiary luetic ulcer. Gummata were discovered in liver, and, therefore, antiluetic treatment given. Prompt and apparently permanent cure.

No. 139. A woman, thirty years old, who had been given salvarsan by a dermatologist one year after a luetic abortion, was suffering from metrorrhagias. Suspicious erosion on cervix, not resembling carcinoma, therefore, diagnosis of luetic ulcer. Patient referred back to dermatologist with request to give another dose of salvarsan. She consulted, however, another gynecologist, who recognized the carcinomatous nature of the ulcer and performed hysterectomy. Patient is now suing the dermatologist for malpractice.

Weil. (Bullet. de la Soc. Franç. de Dermatol. et de Syphil., 1915, xxv, p. 127.)

No. 140. Woman married to syphilitic husband for seven years without showing any syphilitic symptoms. One child, one year after marriage, apparently normal. For last four years, painless metrorrhagias, lasting eight to ten days, not relieved by rest nor increased by exertions, appearing and disappearing

equally abruptly. All possible diagnoses. Two curettages without relief. Wassermann strongly positive, therefore, energetic antiluetic treatment. Metrorrhagias disappeared immediately after first salvarsan injection, and menses regular and normal, for the first time in four years. This improvement lasted almost six months; then return of metrorrhagias. Now also severe headache and other cerebral symptoms (diplopia, vertigo, loss of memory, somnolence. Uterus large, but movable, normal cervix, no pain; dark bloody discharge). Injections of mercury and KI internally. Rapid improvement of all symptoms. Metrorrhagia in all lasted twenty days. Normal menstruation of four days, twenty-two days later.

Diagnosis: Tertiary syphilis of uterus.

Whitesead. (Boston Med. and Surg. Journal, December 17, 1903, p. 671.)

No. 141. Woman of thirty-seven, pregnant eleven times, miscarried twice. Clear history of luetic infection four years ago. Miscarriages and birth of macerated fetus since infection. Of late, metrorrhagias.

Findings: Uterus somewhat retroverted, slightly enlarged, freely movable. Tubes and ovaries apparently normal. Curettage. During next pregnancy potassium iodide. Birth of normal child. A year later headaches, general malaise, menstruations too frequent and too profuse. Examination made under ether: On right side a tumor, size of lemon, apparently the right tube. (Consistency not mentioned.) Mixed treatment. The tumor grows constantly smaller. Ten weeks later another examination under ether. The tumor has completely disappeared. No return of mass within next two years.

Diagnosis: Probably a gumma of tube.

Wile and Senar. (Surgery, Gynecology and Obstetrics, 1915, xxi, p. 643.)

No. 142. Patient, thirty-seven years old, mother of four children, youngest eleven years; also had three miscarriages. Infected by husband with gonorrhea six years ago. Two years

later again chronic vaginal discharge. During past two years exposed to infection extramaritally. One month ago, after a regular menstruation, marked increase in vaginal discharge, described as foul smelling, watery fluid, often becoming sanguineous at night. The discharge continued to increase in amount and became yellowish. Loss in weight and progressive weakness. Hair falling out. Sore throat with hoarse voice. During last few days she noticed small lumps behind her ears and an eruption over her body.

Findings: Maculopapular, typical secondary syphiloderma over trunk and extremities. No mucous patches. Cervix markedly edematous, left side being larger and considerably more indurated. Over the edematous portion, and over upper right side of cervix an extensive superficial erosion, decidedly hemorrhagic in character. The rest of mucous membrane covering the os normal, but of purplish color. Axillary and submammary lymph glands only slightly palpable, those of cervical and inguinal region markedly enlarged. Living spirochetes in smear from the lesion.

Diagnosis: Initial sclerosis on cervix.

No. 143. Girl of eighteen, complaining of severe nocturnal headaches for last two weeks. Has no knowledge of syphilitic infection, but thinks that her paramour has the disease.

No skin eruption. Mucous membranes of mouth and pharynx normal. External genitalia normal. About the anus numerous macules suggesting the beginning of large moist papules, but no infiltration of these lesions. On the left side of the lower cervical lip a small dark red erosion about 1 cm. in its widest diameter. This erosion is sharply demarcated from the remaining portion of the os uteri. Slight discharge of a thin serous fluid. Marked general adenopathy. Wassermann positive. After second injection of salvarsan the lesion practically healed, only a slight bulging and reddening of posterior lip remained. Living spirochetes found in smear from lesion.

Diagnosis: Primary chancre of cervix.

Winckel. (Lehrbuch der Frauenkrankheiten, 1890, p. 178.)

No. 144. Patient is twenty-eight years old. White vaginal discharge at the age of seventeen. Two years later, eruption on face and arms treated by inunctions. Very soon afterward

affection of left eye which went from bad to worse. At the age of twenty suffered from gastric ulcers, followed in nine months by peritonitis. At that time the hair fell out but later it grew again. At the age of twenty-two the first hemorrhage from genitals, which reoccurred at intervals of six months associated with pain in sacral region. Three years later inflammation of throat. Patient was never well, never able to do any work. Confessed to have had sexual relations three months after the appearance of the skin eruption. Denied ever having had genital ulcers. Never pregnant.

Examination shows an inflammatory process in left eye, opaque membranes covering the conjunctiva. Right eye normal. Flat grayish spot on right tonsil. Vulva slightly reddened. Large labia normal. On separation of small labia a grayish pseudomembrane is found. It begins above the urethra, passes into it, stretches over anterior vaginal wall through entire vaginal canal up to the cervix. Externally it ceases abruptly at the edges of the frenulum and of the small labia, extends upward to the vaginal vault, and, at one time only, a small white spot as large as a pea, was seen on the posterior uterine lip, but not at the border of the os. The external os is smooth, there is no cervical discharge, Uterine sound shows normal conditions.

The membranes or deposits on the vagina, in some places, are several millimeters thick, may be easily pulled off, and the parts beneath are pale red. Vaginal wall scarcely more rigid than normal, the process being limited to the mucous and submucous tissue. Despite all caution, finger or speculum push these membranes before them, and the examination thus interfered with causes much pain. There is no hemorrhage, no secretion. At first sight the affection seems a general croupous inflammation of the vagina, resembling the condition caused by the strong application of alum or a solution of sesquichloride of iron.

Microscopic examination of exfoliated masses reveals numerous cell-like fatty corpuscles, containing crystals, easily dissolved by ether, and thick layers of cornified, epidermis-like, squamous epithelium. A piece of tissue near a caruncle is excised and studied microscopically by Birch-Hirschfeld: Epithelium greatly thickened. Epidermis-like upper layers in many places loosened in masses or lamellæ, like a membrane. The epithelial

stratum corresponding to the rete Malpighii also much thickened and contains very large cells. The papillary bodies greatly hypertrophied, the submucous tissue greatly increased, containing very many thick-walled vessels between which the tissues were abundantly infiltrated with round and fusiform cells, so that it looked like a section of fresh gummatous proliferation.

Further observation: New membranes were found within two or three days in places from which they had been removed. Membranes were not spontaneously expelled because they were too dry. Patient never had fever. Principal complaint was abdominal and sacral pain and pain in the affected eye. The membranes of conjunctiva and vagina were alike in every respect.

Since the condition was neither a simple croup nor a diphtheria, Winckel felt that it should be named *colpitis gummosa*, although he acknowledged that its syphilitic origin was not established. He realized that there was neither a clear history nor evidences of such an infection and that the patient was not benefited by a specific treatment. The falling out of the hair presented the only suspicious symptom.

Wolter. (Muenchener med. Wchnschr., May 19, 1896, p. 474.)

No. 145. Woman with history strongly suggestive of syphilis has given birth to nine stillborn children. About seven months after last confinement she began having severe metrorrhagias. Examination seven weeks later: An ulcer covering right half of portio, apparently extending into cervical canal, bleeding easily. Left half of portio normal. Uterus of normal size. Discharge free and of bad odor. Edges of ulcer smooth, no hardening or nodules. Case is considered suspicious of carcinoma, syphilis not being considered at that time. To check the hemorrhage vagina is packed with iodoform gauze. On same evening another very profuse hemorrhage. It now occurred to Wolter that the condition on cervix may be due to necrosis of a cervical gumma. Potassium iodide is followed by prompt improvement. Ulcer decreases in size from day to day, and is completely cicatrized three weeks later. The severity of the last hemorrhage suggested an abortion, but he felt justified in excluding this diagnosis because there was no

basis for such an assumption. Thus *per exclusionem et ex juvantibus* he determined upon the diagnosis of a syphilitic ulcer of the cervix.

Zomakion. (Archiv f. Dermat. und Syphilis, 1913, cxvi, p. 329.)

No. 146. Woman of twenty-nine, mother of two full-term children. Two months ago abortion in second month. Husband recently treated for sores on penis. Of late patient has persistent purulent discharge and irregular uterine hemorrhages. Pain in inguinal region. Left large labium edematous. Uterus in anteversion. Right adnexa large and tender (salpingo-oöphoritis). Portio hard and thickened. A rough area palpable on the posterior and on part of the anterior cervical lip. In speculum an ulcer visible, fatty, glistening, covering part of anterior and posterior cervical lip.

Diagnosis: Ulcus durum portionis. Eight days later roseola over chest.

No. 147. Patient, twenty-three years old, married six years. One full-term child and two criminal abortions. Purulent discharge occasionally containing some blood for last month. A physician made the diagnosis of cancer and suggested hysterectomy.

Findings: Uterus in anteversion. On portio, to right of orifice, a painless thickening palpable, In speculum an erosion visible on right half of thickened cervix, chiefly occupying posterior and only part of anterior lip. Stellate tear in angle of external os. The affected portion of cervix broader than the other healthy side. The ulcer is of copper-red color; in its centre a dirty gray film, disclosing the red base at the periphery. The indurated portion of cervix is surrounded, and thus distinctly separated from the rest, by two perpendicular grooves. Ulcer secretes but slightly, is not tender, and becomes visibly paler under pressure of sound. Spirochetes are not found in smears.

Diagnosis: Primary chancre of cervix.

BIBLIOGRAPHY

All abstracts and quotations are indicated as such. All other references have been studied in the original.

Almkvist. Dermat. Wchnsch., 1913, lvi, p. 190.

Andrewes. Power and Murphy, System of Syphilis, 1914, i, 109.

Astruc. Traité des maladies vénériennes, Paris, 1755, iv, p. 177.

Audrain. Soc. franç. de Dermat. et de Syph., meeting of December 4, 1913.

Bab. Zeitschr. f. Geb. u. Gynäk., 1907, lx, p. 161.

Bab. Zentralbl. f. Gynäk., 1909, p. 527.

Baisch. Beiträge zur Geb. u. Gynäk., 1903, vii, p. 1.

Ballantyne and Williams. Brit. Med. Jour., 1891, vol. i, p. 171.

Balzer. Compt. rend. du Congr. internat. de Dermat. Paris, 1890, p. 251, quoted by Neumann.

Bandler. Medical Gynecology, Saunders, 1908, p. 430.

Barbiani. Giorn. ital. della mal. ven. e della pelle., 1900, xxxv, p. 6, quoted by Nielsen.

Barthélemy. La Syphilis, 1905, p. 685.

Barthélemy. Annales de Dermatol., 1895, vi, p. 1000.

Baumgarten. Virchows Archiv, 1884, xcvii, p. 14.

Bennett. Traité prat. de l'inflammation de l'utérus, etc., Paris, 1850, quoted by Delaunay and Darré.

Bernutz. Union méd., June 7, 1855, quoted by Neumann.

Besson. Practical Bacteriology, Microbiology and Serum Therapy, translated by Hutchens, 1913.

Blanc. Lyon méd., 1891, lxvi, p. 440, quoted in Winckel's Handb. d. Geb., 1904, ii, p. 931.

Bobrie. Annales des malad. vénér., 1914, ix, p. 31.

Bockhart. Monatshefte f. prakt. Dermat., 1885, iv, p. 417.

Boivin and Dugès. Traité prat. des malad. de l'utérus, Paris, 1833, p. 577, quoted by Laffont, p. 118.

Boldt. Quoted in Martin, Krankheiten der Eileiter, Leipzig, 1895.

Boldt. Academy of Medicine, New York, April 27, 1899, quoted by Laffont, p. 40.

Bonnet. Thèse de Paris, 1886, quoted by Herxheimer.

Bosse. Berliner Klinik., 1913, xxv, fasc. 296.

Brassart. Echo méd. du Nord, 1905, quoted by Laffont, p. 26.

Brioude. Thèse de Paris, 1896, quoted by Laffont.

Brumpt. Bull. de la Soc. de Pathol. Exot., 1908, i, rev. in Zentralbl. f. Bakteriol., 1909, xliii, ref. p. 339.

Bumstead and Taylor. Quoted in Neumann, Syphilis, p. 716.

Buschke and Michael. Berlin. klin. Wchnschr., 1914, No. 51.

Caan. Münchner med. Wchnschr., April 4, 1911.

Chaleix-Vivie. Revue de Gynéc. Obst. et Péd. de Bordeaux, 1901, rev. in Annales de Dermat, 1901, ii, p. 807.

Chambrelent. Revue méd.-chir. des Maladies des Femmes, Paris, viii, p. 487.

Chase. Texas State Journal of Medicine, 1913, p. 95.

Courty. Traité prat. des malad. de l'utérus, etc., Paris, 1872, quoted by Delaunay and Darré.

Dalché. Gaz. des Hôpitaux, June 15, 1905, p. 795.

Dalché and Fouquet. Sém. Gynéc., 1913, xviii, p. 109.

Delaunay and Darré. Gaz. des Hôpitaux, September 16, 1905, p. 1251.

Delblanco. Revue des Hôpitaux, 1905, rev. in La Syphilis, 1905, iii, p. 638.

Després. Traité iconographique de l'ulcération du col de l'utérus, Paris, 1870, quoted by Delaunay and Darré.

Doederlein. Veit's Handbuch der Gynäk., Wiesbaden, 1907, ii, 127.

Doléris. Arch. de Tocol., 1885, p. 319, quoted by Laffont, p. 25.

Dorsett. Weekly Medical Review, St. Louis, August 15, 1891, p. 121.

Doutrelepont. Deutsche med. Wchnschr., 1887, xiii, p. 1016.

Dreyer. Dermatol. Ztschr., 1906, xiii, p. 537.

Duparcque. Treatise on the Functional and Organic Diseases of the Uterus, translated by Warrington, Philadelphia, 1837.

Engman. Dermat. Wchnschr., 1912, lv, p. 1347.

Fasola. Quoted by Oui.

Feulard. Des Gommes Syphil., 1888, vol. iii, quoted by Barthélemy.

Finger. Sitzungsber. der k.k. Akad. d. Wissensch., Wien, 1905, iii, p. 497, quoted by Metchnikoff.

Finger. Dermat. Wchnschr., 1914, lix, p. 1221.

Foerster. Lancet, June 24, 1911, quoted by Fox.

Fordyce. Jour. of Cutan. Dis., 1915, xxxiii, p. 802.

Fordyce. American Journal of Medical Sciences, June, 1915, p. 781.

Fournier. Leçons cliniques sur la Syphilis, Paris, 1881.

Fournier. Annales de Dermat., 1895, vi, p. 1000.

Fox. Medical Record, August 16, 1913, p. 283.

Franceschini. Annales de malad. vénér., 1906, i, p. 241.

Franceschini. Gaz. degli Osped. e delle Clin., April 29, 1909, rev. in La Ginecol. Moderna, 1909, ii, p. 432.

Franqué. Ztschr. f. Geb. u. Gynäk., 1907, lx, p. 238.

Freund. Winckel's Handb. der Geburtsh., vol. ii, p. 2173.

Fromme and Heynemann. Veit's Handb. der Gynäk., vol. v, p. 178.

Frommer. Archiv. f. Gynäk., 1914, ciii, p. 338.

Fruehwald. Dermat. Wchnschr., May 29, 1915, p. 513.

Fuller. Morrow's System of Gen. Urin. Diseases, 1893, ii, p. 463.

Gardillon. Essai sur le chancre du vagin., Paris, 1881, quoted by Bockhart.

Gardner and Goodall. Brit. Med. Jour., 1906, ii, p. 1176.

Gautier. Ztschr. f. physik. Chemie, 1902, xxxvi.

Gelli. Sémaine Méd., June 20, 1896, quoted by Laffont.

Glueck. Wien. mediz. Presse, 1881, p. 32, quoted by Bockhart.

Goldenstein. Thèse de Paris, 1908.

Gosselin. Arch. gén. de médicine, 1843, ii, p. 129, quoted by Delaunay and Darré.

Gougerot. La Syphilis expérimentale, Paris, 1913, p. 9.

Graefenberg. Archiv f. Gynäk., 1909, lxxxvii, p. 190.

Griffith. Proceedings of Royal Soc. of Med., London, 1914, vol. vii, part II, Obst. and Gyn. Sect., p. 123.

Guérin. Les Maladies des Org. Génit. Extern. de la Femme., 1864, quoted by Delaunay and Darré.

Henck. Therapeutische Monatshefte, 1912, xxvi, p. 782.

Hennig. Quoted by A. Martin, also by Graefenberg.

Hertoghe. Bull. de l'Acad. de Médic., Belgique, xxiii, quoted by Ries.

Herxheimer. Ergebnisse d. allgem. Pathologie u. path. Anat., 1906, xi, 1, pp. 1 to 309.

Hill. Quoted by Neumann, Syphilis, p. 716.

Hillman. Am. Jour. of Obst., 1913, lxviii, p. 343.

Hitschmann and Adler. Archiv f. Gynäk., 1913, c, p. 233.

Hoffmann. Atlas der etiol. u. experim. Syphilisforschung, Berlin, 1898.

Hoffmann and Wolters. Quoted in System of Syphilis, vol. iv, p. 64.

Horand. Syphilis et Cancer, Paris, 1908, p. 58.

Hornor. Boston Med. and Surg. Jour., February 10, 1916.

Howitz. Nord. Medic. Ark. Stockholm, April 30, 1908, rev. in Jour. Am. Med. Assn., July 18, 1908, p. 268.

Hubert. Münchner med. Wchnschr., September 28, 1915, p. 1314.

Ivens. Jour. of Obstet and Gynec. of British Empire, vol. xiii, p. 273.

Janet and Lévy-Bing. Gaz. des Hôpitaux, 1913, lxxxvi, p. 326.

Jaworski. Wien. klin. Wchschr., July 20, 1911, p. 1059.

Jayle and Bender. Presse médicale, April 21, 1906.

Jouen. Thèse de Paris, 1905.

Kaarsberg. Hospitalstitende, Copenhagen, 1915, lviii, p. 557, rev. in Jour. of Am. Med. Assn., July 24, 1915, p. 371.

Klink. Revue de scienc. méd., April 15, 1878, quoted by Winckel in Handb. der Geb., ii, 1, p. 611.

Kurz. Jour. of Obstet. and Gynec. of British Empire, 1913, xxiii, p. 353.

Laffont. Sur la Syphilis tertiaire acquise ou héréditaire de l'utérus et ses annexes, Paris, 1908.

Lagneau. Traité prat. des Malad. Syphilitiques, Bruxelles, 1828.

Lambkin. Power and Murphy's System of Syphilis, vol. i, p. 181.

La Mensa. Rassegna internat. della med. moderna., 1900, rev. in Annales de Dermatol. et Syphil., 1901, ii, p. 809.

Lancereaux. A Treatise of Syphilis (1864), Translation published by Sydenham Soc. in London, 1868.

Lecourtois, Labadie-Lagrave et Legueu. Traité médico-chirurg. de Gynéc., Paris, 1904, p. 653, quoted by Pichévin.

Lee. Lancet, July 15, 1890, p. 18.

Letulle and Jayle. Annales de Gynéc. et l'Obst., 1910, vii, p. 53.

Lichtenstein. Quoted by Meyer.

Loeb. Zentralbl. f. inn. Med., 1903, p. 87.

Loehnberg. Ztschr. f. Geb. u. Gynäk., 1913, lxxiii, p. 755.

Lublinski. Deutsche med. Wchnschr., May 19, 1904, p. 767.

McCann. Cancer of the Womb, London, 1907.

McDonagh. Power and Murphy's System of Syphilis, Supplement, p. 140.

McDonagh and Ross. Quoted by Whitehouse.

McIlroy and Watson. Brit. Med. Jour., October 18, 1913, p. 1002.

McIntosh. Jour. of Path. and Bacteriol., 1909, xiii, p. 239.

McIntosh and Fildes. Syphilis from the Modern Standpoint, London, 1911, p. 64.

Martin. Hypertrophie exulcerative syphil. du col de l'utérus, Paris, 1878, quoted by Neumann.

Mauriac. Leçons sur le malad. vénér, 1883, quoted by Bockhart.

Méhanos. Budapesti Orvosi Ujsag., 1911, rev. in Zentralbl. f. Gynäk., 1912, p. 1781.

Meirowsky and Frankenstein. Deutsche med. Wchnschr., August 4, 1910, p. 1444.

Mesnard. Arch. de Tocol. et de Gynéc., 1891, p. 19, quoted in Winckel's Handb. der Geburtsh., ii, 1, p. 63.

Metchnikoff. Power and Murphy's System of Syphilis, vol. i, p. 62.

Meyer. Deutsche med. Wchnschr., 1913, p. 169.

Meyer, Robert. Ztschr. f. Geb. u. Gynäk., 1908, lxii, p. 640.

Montgomery. Medical Record, November 13, 1915, p. 820.

Morgan. Quoted by Laffont, p. 16.

Morisani. Arch. di ost. e gin., 1901, rev. in Zentralbl. f. Gynäk., 1902, p. 294.

Morris. Amer. Jour. of Syph. and Dermat., 1874, v, quoted by Neumann.

Mrazek. Vierteljahresschr. f. Dermat. u. Syphilis, 1888, xiii, p. 47.

Muratow. Zentralbl. f. Gynäk., 1907, p. 830.

Neisser. Die Experimentelle Syphilisforschung, Berlin, 1906.

Neisser. Beiträge zur Pathol. u. Therapie der Syphilis, Berlin, 1911.

Neumann. Syphilis, Wien, 1896.

Nielsen. Dermatol. Wchnschr., February 27, 1915, p. 209.

Nikolsky. Médic. Moderne, 1903, rev. in Zentralbl. f. Gynäk., 1904, p. 720.

Noguchi. Serum Diagnosis of Syphilis, Philadelphia.

O'Day. New York Med. Jour., December 26, 1914, p. 1258.

Oehman. Monatschr. f. Geb. u. Gynäk., 1913, xxxviii, p. 283.

Oppenheim. Atlas der venerischen Affectionen der Portio vaginalis und der Vagina, Wien, 1908.

Orth. Lehrbuch der pathol. Anatomie, Berlin, 1893, p. 389.

Orthmann. Martin's Krankheiten der Eileiter, Leipzig, 1899, p. 351.

Osler and Churchman. Modern Medicine, by Osler and McCrae, 1914.

Oui. Sem. Gynéc., 1913, xviii, p. 325.

Ozenne. Annales de Gynéc. et d'Obst., 1904, lxi, p. 498.

Ozenne. L'Endométrite et Métrite, Paris, 1905, p. 19.

Palmer. Deutsche med. Wchnschr., January 31, 1895, p. 76.

Pankow. Archiv f. Gynäk., 1906, lxxx, p. 271.

Pankow. Zeitschr. f. Geb. u. Gynäk., 1910, lxv, p. 336.

Pernel. Lancet, November 16, 1907, p. 1419.

Pichevin. Gaz. des Hôpitaux, January 14, 1905, p. 5.

Polaillon. Maladies des Femmes, Paris, 1901, p. 524, quoted by Laffont, p. 94.

Pothérat. Gaz. des Hôpitaux, 1911, lxxxiv, p. 199.

Power and Murphy. System of Syphilis, five volumes, second edition, London, 1914.

Pusey. Syphilis as a Modern Problem, Chicago, 1915.

Rasumow. Verhandlungen der Ges. d. Aerzte in Moskau, rev. in Zentralbl. f. Gynäk., 1880, p. 546.

Recasens. Annal. de la Acad. de Obst. Gin. y Ped. (Madrid), 1910, rev. in Zentralbl. f. Gynäk., 1911, p. 533.

Renaul. International Clinics, 1894, iv Ser., vol. ii, p. 219.

Renault. Editorial in Jour. Amer. Med. Assn., October 4, 1913, p. 1308.

Report of Royal Swedish Commission, rev. in Lancet, 1915, clxxxix, p. 1096.

Richet. Traité d'anatomie chirurg., Paris, 1857, quoted by Lancereaux.

Ricord. Leçons sur le chancre, Paris, 1860.

Imchanitzky-Ries and Jul. Ries. Münchn. med. Wchnschr., 1912, lix, p. 1084.

Rille. Deutsche med. Wchnschr., 1904, p. 624.

Rode. Norsk. Mag. f. Laegevid, 1888, rev. in Zentralbl. f. Gynäk., 1889.

Rohrbach. Berlin. klin. Wchnschr., 1912, xlix, p. 589.

Rollet. Traité des malad. vénér., Paris, 1865.

Rollet. Annales de Dermat. et de Syphil., 1869, quoted by Delaunay and Darré.

Rostaine and Druelle. Arch. génér. de médic., December 15, 1903, p. 3152, quoted by Thibierge.

Routh. Proceedings of the Royal Society of Medicine, London, 1914, vol. vii, part II, Obst. and Gyn. Sect., p. 123.

Runge. Ztschr. f. Geb. u. Gynäk., 1913, lxxiii, p. 332.

Schaeffer. Monatschr. f. Geb. u. Gynäk., 1912, xxxv, p. 339.

Schottlaender. Wiener med. Wchnschr., November 1, 1913, p. 2897.

Schumann. Am. Jour. Obstet., 1913, lxvii, p. 980.

Schwartz. Étude sur les chancres du col utérine, Paris, 1873, quoted by Delaunay and Darré.

Shaw. Jour. Obst. and Gynec. of British Empire, 1907, xi, p. 124.

Shaw-Mackenzie. Lancet, September 18, 1897.

Shaw-Mackenzie. British Med. Jour., October 14, 1899, p. 985.

Shillitoe. Power and Murphy's System of Syphilis, vol. i, p. 226.

Sigmund. Ztschr. d. Gesellsch. d. Aerzte, Wien, 1855, quoted by Mrazek.

Sinclair. Albutt's System of Gynecology, London, 1906, p. 345.
Siredey. Annales de Gynécol. et d'Obst., 1904, lxi, p. 498.
Siredey. Hygiène des Malad. de la Femme, Paris, 1907.
Skutul. Jour. Obst. Russian, 1911, rev. in Zentralbl. f. Gynäk., 1912, p. 1781.
Smith, Lewis Watson. Am. Jour. Obst., 1914, lxix, p. 335.
Spinelli. Arch. ital. di Gin., 1901, rev. in Münchn. med. Wchnschr., 1901, xlviii, p. 1941.
Squier. Trans. Amer. Gyn. Soc., 1913, p. 376.
Stuehmer. Deutsche med. Wchnschr., 1912, xxxviii, p. 982.
Sweeney. Am. Jour. Obst., 1913, lxviii, p. 243.
Thibierge. Annales de Dermatol., 1904, v, p. 113.
Thomsen. Beiträge zur pathol. Anat. u. allgem. Pathol., 1905, xxxviii, p. 524.
Trinchese. Münchn. med. Wchnschr., 1910, p. 570.
Trinchese. Beiträge zur Geb. u. Gynäk., 1913, xviii, p. 201.
Uhlenhut and Multzer. Berl. klin. Wchnschr., April 28, 1913, p. 769.
Verchère. Annales de Dermatol., 1895, vi, p. 1005.
Verdalle. Annales de Dermat., 1905, p. 1126.
Viannay. Lyon méd., May 15, 1898, p. 73, rev. in Zentralbl f. Gynäk., 1899, p. 1555.
Virchow. Die krankhaften Geschwuelste, 1864, ii, p. 437.
Wagon. Thèse de Paris, 1912.
Warthin. Trans. Assoc. Am. Physicians, 1914, xxix, p. 416.
Wassilieff. Jour. de Méd. de Paris, 1904, xvi, p. 284.
Weber. Die Syphilis im Lichte der modernen Forschung, etc., Berlin, 1911, quoted by Meyer.
Wegscheider. Ztschr. f. Geb. u. Gynäk., 1913, lxxiii, p. 330.
Whitehead. Arch. gén. de méd., 1857, ii, p. 375, quoted by Lancereaux.
Whitehouse. Proceedings of the Royal Society of Medicine, London, 1914, vol. vii, part II, Obst. and Gynec. Sect., p. 123; also in Jour. Obst. and Gyn. of British Empire, 1913, xxiv, p. 326.
Wile and Senear. Surgery, Gynec. and Obstet., 1915, xxi, p. 643.
Winckel. Handbuch der Geburtshilfe, Wiesbaden, 1903 to 1906.
Woyer. Wiener med. Presse, 1902, rev. in Zentralbl. f. Gynäk., 1903, p. 751.
Wyder. Archiv. f. Gynäk., 1878, xiii, p. 1.
Zeissl. Deutsche Klinik, 1905, x, p. 645.
Zomakion. Archiv f. Dermatologie and Syphilis, 1913, cxvi, p. 329.

DESCRIPTION OF ILLUSTRATIONS

FIG. 1.—Ulceration on posterior surface of cervix—soft, nodular, elevated; late secondary stage. (Personal observation VI.)

FIG. 2.—Secondary ulcer of posterior lip of cervix—soft, elevated, extending into cervical canal. Entire cervix edematous. A deeply congested area on anterior lip just above the orifice. (Personal observation IV.)

FIG. 3.—Secondary ulceration on anterior surface of cervix, exhibiting deep fissures. The ulcer is slightly elevated and of soft consistency. (Personal observation V.)

FIG. 4.—Primary chancre of cervix engrafted upon an erosion. (From Oppenheim.)

FIG. 5.—Superficial ulcers on anterior lip of cervix, bleeding freely during menstruation; late secondary stage. (Personal observation VIII.)

FIG. 6.—Tertiary lesions on anterior surface of cervix. The cervix is covered by fairly large, dark red blotches in such a way that only a few small islands of normally pale mucosa separate the areas of discoloration. (Personal observation XI.)

FIG. 7.—Primary chancre of cervix. (From Fournier.)

FIG. 8.—Multiple chancres of cervix. (From Fournier.)

FIG. 9.—Superficial ulcers on cervix in process of healing. A small, clean ulcer in posterior cervicovaginal junction from which spirochetes are recovered. Late secondary stage. (Personal observation VII.)

FIG. 10.—Maculopapular eruption on cervix, vagina, and outer genitals. (From Oppenheim.)

FIG. 11.—Gumma of cervix which had developed, within two months, from the ulceration seen in Fig. 1. (Personal observation VI.) The tumor has the size of a child's fist, is hard in its basal and soft in the superficial portion. The funnel-shaped orifice is in the center.

FIG. 12.—Section through tissue of cervical ulceration seen in Fig. 1. Stained after Levaditi's (second) method. Two typical spirochetes are shown. In another part of this section several colonies of gonococci are seen (not represented in this picture).

FIG. 13.—Early stage of gumma of cervix. (Personal observation XIII.) Squamous epithelium of vaginal portion in upper part of picture. In the centre a darker area indicates the beginning gumma formation. Several well-circumscribed foci of granulomatous infiltration. On the left, near the periphery, the infiltration is diffuse.

FIG. 14.—The same section under higher power. A focus of infiltration with lymphocytes and plasma cells surrounded by a sort of capsule. The center contains epithelioid cells. One giant cell within the focus, two others at the periphery; one of these contains thirty-six nuclei. Many newly-formed bloodvessels with thickened intima.

FIG. 15.—The same section, showing a bloodvessel with organized thrombus or proliferated endothelium. Diffuse granulomatous infiltration of the tissues.

Fig. 16.—Section through tertiary ulceration of vulva. (Personal observation XVIII.) Atypical proliferation of squamous-cell epithelium into subjacent area of round-cell infiltration. Slender, irregularly-shaped processes with intact basal membrane.

Fig. 17.—Section through tertiary ulcer of labium. (From Rohrbach.) The basal membrane is broken through by several projections. The invading cells no longer resemble normal cells. The nuclei are large, light in color, and vesicular; the contours of the cell bodies are hardly distinguishable.

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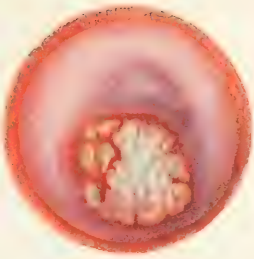

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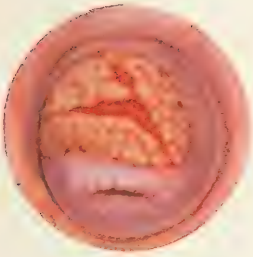

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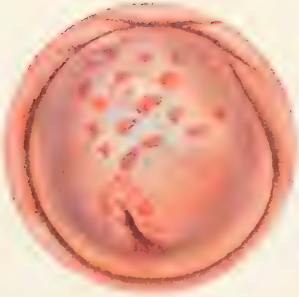

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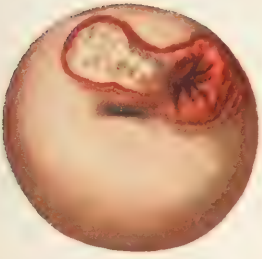

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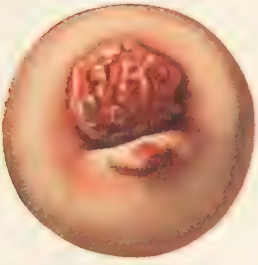

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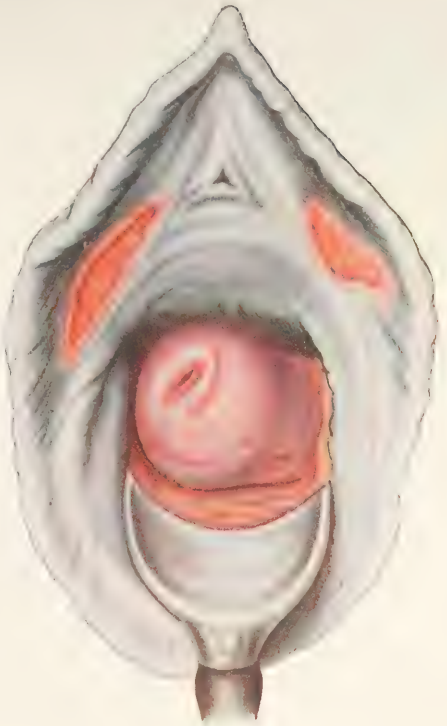
SYPHILIS OF THE INTERNAL GENITAL ORGANS IN THE FEMALE—GELLHORN AND EHRENFEST.



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SYPHILIS OF THE INTERNAL GENITAL ORGANS IN THE FEMALE—Gellhorn and Ehrenfest.

Fig. 11

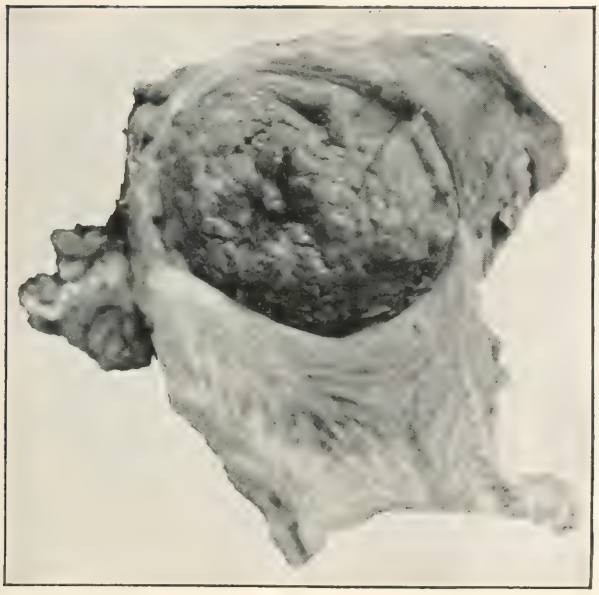


Fig. 12

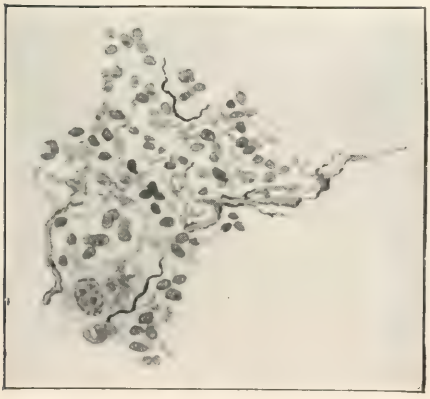


Fig. 13

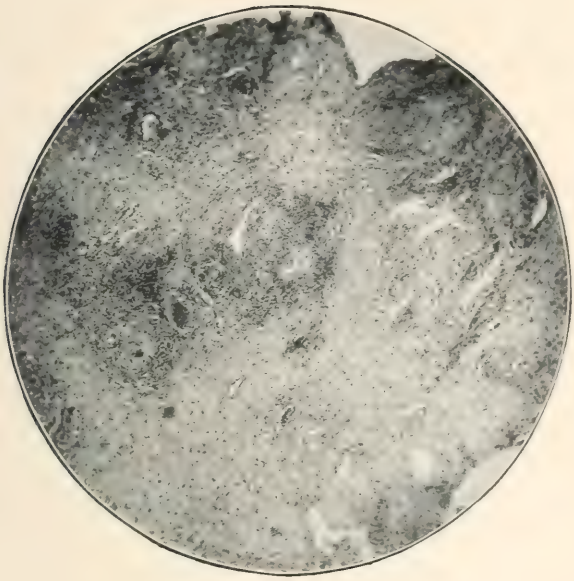


Fig. 14

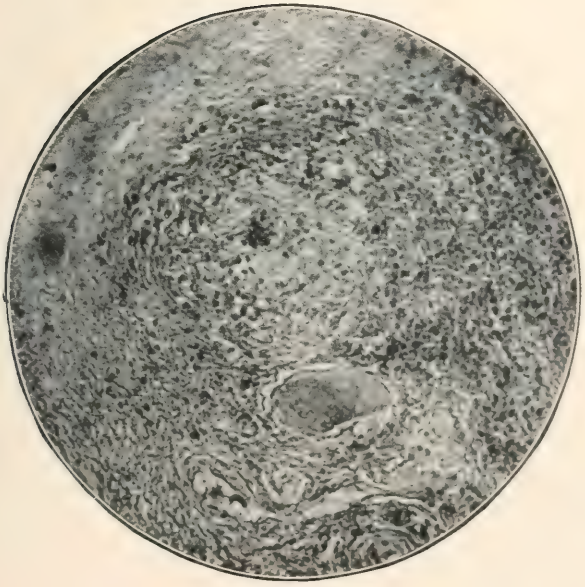


Fig. 15

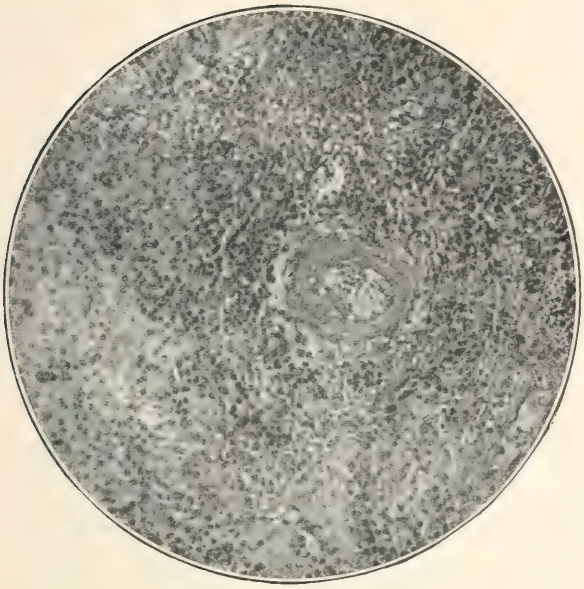


Fig. 16

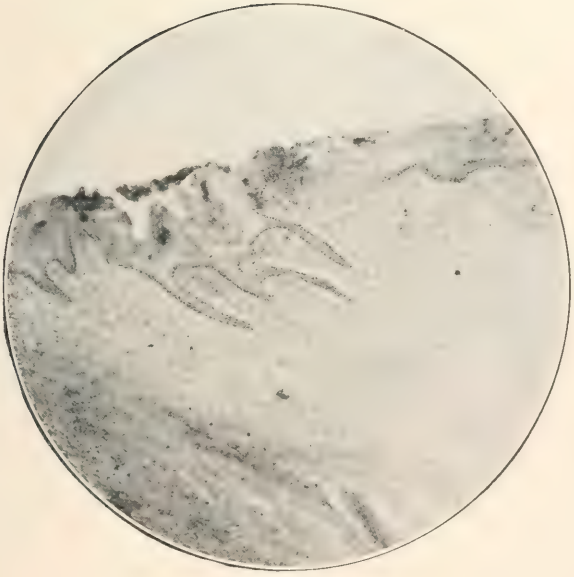
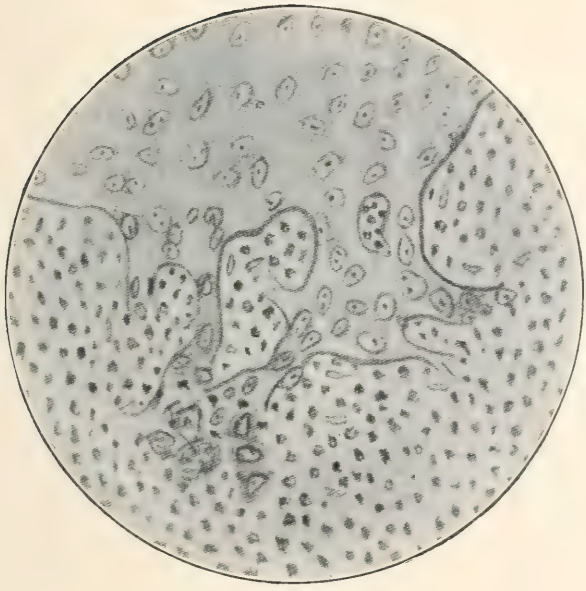


Fig. 17



SPECIFICITY OF THE WASSERMANN REACTION

By Rudolph Buhman, M.D.
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(By Invitation)

Since the introduction of the Wassermann reaction into the realm of medicine it has taken its place in the front rank of the various laboratory tests and reactions as an aid to the clinician in clearing up many of the obscure cases with which he is confronted. It has received both praise and condemnation at the hands of these clinicians: praise if it aided them in the diagnosis of some complicated case, and condemnation if it did not coincide with the clinical findings.

The reaction is based primarily upon the Bordet-Gengou phenomenon of complement-fixation, which is that the presence of an immune or antibody in the blood serum in conjunction with the specific antigen will fix complement; the fixation of complement is determined by the addition of corpuscles and their amboceptor, if hemolysis takes place then complement has not been fixed; if, however, hemolysis does not occur, then complement has been fixed. To illustrate the serum from a typhoid fever patient in conjunction with an emulsion of typhoid organisms fixes complement and prevents hemolysis taking place upon the addition of corpuscles and their amboceptor.

Upon this theory Wassermann assumed that the serum from a syphilitic patient plus its antigen would likewise fix complement. However, as the organisms were not then obtainable in pure culture, he substituted for his antigen

a watery extract from tissues rich in spirochetes. By this method he obtained a fixation of complement when the serum of a syphilitic person was used, whereas there was no such fixation when the serum was from a normal person. It was therefore assumed that the reaction was the result of a specific antigen and antibody combination. This may have been true, as Noguchi has obtained fixation of complement with the serum from some syphilitic patients with an antigen made from an emulsion of spirochetes in pure culture.

The specificity of the reaction, however, received a setback a short time later when it was shown by Levaditi Yamanouchi,[1] Porges and Meier,[2] Landsteiner, Müller and Potzl,[3] Noguchi[4] and others that alcoholic extracts of normal as well as syphilitic organs had the properties of binding complement in the presence of serum from a syphilitic individual.

Although the true explanation of the nature of the reaction is lacking, it is known that it does not correspond, in the ordinary biological sense, to that between antigen and antibody as was originally believed. Subsequent work has tended to indicate that it is due to an interaction of lipoidal substances. Future work along the lines of immuno chemistry may ultimately elucidate the peculiar character of the reaction. Should such be the case, however, the diagnostic value of the reaction will not thereby be increased.

From the foregoing it is obvious that the reaction is not a specific one. Now the question naturally arises, "May conditions other than syphilis give a positive reaction?" If one accepts the reports in the literature then he must believe that almost all the diseases to which the human system is heir will give positive reactions.

Thus, positive reactions have been reported in frambesia (Bruck,[5] Hoffman and Blumenthal[6]), in which the etiological organism is Spirocheta pertenuis. In recurrent fever and dourine, Korschun and Liebfried[7] report 50 per cent. of posi-

tive reactions. The organisms of these three diseases are very closely allied to the Spirocheta pallida, which may account for the positive reactions in them. Eichelberger[8] reports positive reactions in 40 per cent. of a series of scarlet fever cases; Jacobovis,[9] 18 out of 55 cases of scarlet fever; Weil and Braun[10] report positives in sepsis, cancer, typhoid fever, tuberculosis, and diabetes; Wechselman and Meier,[11] Eitner,[12] Jundell, Almkvist and Sandman[13] and others report positives in leprosy; Boehm,[14] Reinhard,[15] Valerio,[16] report positives in malaria; Halberstaedter, Müller and Reiche,[17] report positives in measles, varicella, and pertussis; Treuber,[18] in lymphosarcoma; Boas and Peterson,[19] report 3 positives out of 60 cases of chloroform narcosis; Wolfsohn[20] Reicher,[21] in veronal-morphin-scopolamin-ether narcosis; Dreyer[22] in lead poisoning; Richards[23] in diabetes with acidosis; Lassen[24] in sarcoma; Hesse[25] in 9 of 11 cases of pemphigus; Sutherland and Mitra[26] in 9 of 50 cases of malaria, 3 of these were luetic, 10 out of 38 of kala azar, 7 out of 34 cases of leprosy: Verdozzi and Urbana[27] report 8 positives out of 9 cases of cancer of the liver; Craig[28] reports that the presence of certain strains of staphylococci and streptococci will convert negative reactions into positive ones, Caan[34] reports 35 positives out of 85 cases of carcinoma, and Semon,[29] Daunay,[30] and Zubrycki,[31] report positives in eclampsia with jaundice. Serums heavily laden with bile will occasionally prevent homolysis taking place without the addition of an antigen.

The above reports, however, must be accepted with a good deal of reservation for the following reasons:

1. The majority of these reports date back to the infancy of the reaction.

2. The liability of error on account of the delicacy of the technic required in the performance of the reaction.

3. That as our knowledge of the technic advanced, the number of positives in diseases other than syphilis has gradually decreased.

4. Statistics of results obtained by other men, in which it is the exception that positives are obtained in diseases other than syphilis: namely, Browning and McKenzie,[35] Scheidemandel,[36] and MacCormac and Morson.[37]

The abundance of material furnished at the Barnard Free Skin and Cancer Hospital gave me the opportunity to compare the various statistics enumerated above and to contribute to the question. The following cases were examined: 136 cases of malignant diseases, 53 cases of skin diseases, and 99 cases of miscellaneous diseases.

The original Wassermann method was adhered to with two exceptions, namely, the quantity of all of the reagents was reduced one-half and the watery extract antigen was replaced with alcoholic extracts. One-half the original quantity was used, because too much blood would be necessary, since two or more antigens are used in each case.

Hemolytic system: Sheep corpuscles; their amboceptor and complement.

Sheep blood is obtained from an abattoir, immediately defibrinated, washed not less than five times with sterile saline solution and used within twenty-four or forty-eight hours. This plan is uniformly adhered to. The variation in the density of the suspension is then but negligible. Occasionally, one will meet with cells that are unduly fragile and will therefore show some hemolysis. This is easily determined by making up a 5 per cent. suspension of the cells in normal saline solution, placing them in the refrigerator overnight; if the supernatent fluid is tinged, some hemolysis has taken place. These are not to be used.

Amboceptor: The antisheep rabbit amboceptor is used. This remains fairly constant for a period of from four to eight months if sealed in small ampoules and kept constantly in the refrigerator.

Complement: Fresh guinea-pig serum is used. As there is more or less variation in the strength of the complement in different pigs, it is preferable to use the pooled blood from

several healthy animals. The complement and amboceptor must be titrated for their respective units before the day's work is begun.

Antigens: It has been my custom to use three different antigens for the past two years. These are all prepared by a similar method as follows:

The tissues, fat-free, are minced and placed in absolute alcohol in the proportion of 1 gram of minced tissue to 10 c.c. of alcohol, incubated for a period of time (usually four to six weeks), with frequent agitation, then filtered and kept at room temperature.

Antigen A: Guinea-pig heart:

Antigen B: Liver from a case of congenital lues or liver from an infant.

Antigen C: A cholesterin fortified human heart, prepared according to the method of Walker and Swift.[32]

The antigens must be carefully titrated for their anti-complementary, hemolytic, and antigenic properties before they are used. The guinea-pig heart and the fetal liver antigens are not as sensitive as the cholesterin fortified one; the latter is unquestionably the most sensitive and reliable of all of the antigens.

The material investigated may be divided into three groups.

TABLE I—SKIN DISEASES

Disease.	Number of cases.	Negatives.	Positives.	Weakly positives.
Pityriasis rosea . .	8	8	None	None
Scabies	15	15	None	None
Dermatitis . . .	5	5	None	None
Eczema	25	25	None	None
Total	53	53		

In this series of skin diseases are 8 cases of pityriasis rosea, which resembles the secondary eruption of syphilis very much, and frequently the clinician has to rely upon the Wassermann reaction to arrive at a correct diagnosis.

TABLE II—MALIGNANT DISEASES

Disease.	Number of cases.	Negatives.	Positives.	Weakly positives.
Sarcoma	12	12	None	None
Malignant adenoma	15	15	None	None
Glioma of brain	2	2	None	None
Carcinoma	107	96	9	2
Total	136	125	9	2

This table gives the very interesting result, that of 136 cases of malignant diseases only 9 were positive and 2 weakly positive, and 125 gave negative results. The sarcoma and carcinomas represent the various types of these diseases and in each case were confirmed by microscopic section. Of the 9 positive reacting cancer cases, 6 became negative or remained only weakly positive under antiluetic treatment. The remaining 3 cases discontinued treatment or failed to return for later observation; 3 of the positives were epitheliomas of the tongue, probably developing on a luetic base, as the patients gave a history of what was no doubt leukoplakia. The 2 cases that reacted weakly positive were carcinomas of the cervix.

TABLE III—MISCELLANEOUS DISEASES

Disease.	Number of cases.	Negatives.	Positives.	Weakly positive.
Trichinosis	3	3	None	None
Pernicious anemia	4	4	None	None
Hodgkin's disease	3	3	None	None
Sporotrichosis	3	3	None	None
Scarlet fever	15	15	None	None
Leprosy	6	3	3	None
Tuberculosis	35	33	2	None
Malaria	10	10	None	None
Arthritis	6	6	None	None
Meningitis	10	10	None	None
Streptococcus infection	4	4	None	None
Total	99	94	5	None

Table III shows that of 99 cases, including 5 positive, 3 of the 5 positive reacting ones were leprosy of the tuberculous type. The other 2 were tubercular cases both of which gave a fairly definite history of lues.

Interpretation of the Reaction. A weakly positive reaction; anything over 50 per cent. of hemolysis should not be interpreted as a syphilitic reaction unless there is some clinical evidence of the disease or a definite history of the infection. An individual should be spared the humiliation and condemnation of being branded with this dreaded disease with no more evidence than a weakly positive reaction. On the other hand it is the duty of the physician to protect the innocent from the possibility of an infection from one who suffers from this disease. There should be coöperation between the clinician and the serologist in all such doubtful cases; repeated Wassermann reactions should be made.

If these do not clear up the case then the provocative treatment should be resorted to, preferably a dose of salvarsan, or ten days or two weeks of mixed treatment, which usually has the effect of producing a stronger reaction if syphilis be present.

A strong positive reaction, except in very rare and easily differentiated cases, is positive proof of a syphilitic infection, even in the face of no other evidence of the disease.

A negative reaction, however, is not conclusive evidence of the absence of syphilis. The reaction is always negative in the early primary infections, usually not becoming positive until the third or fourth week. According to Craig and Nichols[33] the ingestion of a large quantity of alcohol will convert positive into a negative reaction. A case of syphilis that has been under treatment may react negatively, which is simply evidence that sufficient medication has been administered to neutralize the Wassermann body temporarily, likewise the serum from tabetics will react negatively in something like 35 per cent. of cases.

Insofar as the practical value of the reaction has been established the clinician should be urged to make use of same in all obscure cases.

Conclusions. Theoretically, the Wassermann reaction is not specific; practically it is highly specific.

A strong positive reaction with proper controls and accurately titrated reagents is conclusive evidence of syphilis, excepting a few diseases, which can easily be excluded clinically.

The diagnosis of syphilis cannot be made upon a weakly positive reaction without some clinical evidence of the disease.

A negative reaction does not exclude a syphilitic infection.

Malignant diseases do not give positive reactions.

References

1. Levaditi and Yamanouchi. Compt. rend Soc. de biol., Paris, 1907, t. 63, p. 740.
2. Porges and Meier. Berlin. klin. Wchnschr., 1907, p. 1655, and 1908, p. 731.
3. Landsteiner, Müller and Potzl. Wien. klin. Wchnschr., 1908, p. 86.
4. Noguchi. Jour. Exp. Med., 1909, xi, 84; Jour. Am. Med. Assn., 1912, p. 1163.
5. Bruck. Die Serodiag. de Syphilis, Berlin, 1909.
6. Hoffman and Blumenthal. Dermatol. Ztschr., 1908, Bd. xv, p. 23.
7. Korschun and Liebfried. Deutsch. med. Wchnschr., 1909, p. 1179.
8. Eichelberg. München. med. Wchnschr., 1908, p. 1206.
9. Jakobovis. Jahrbuch. f. Kinderheilk, Berlin, February, 1914.
10. Weil and Braun. Wien. klin. Wchnschr., 1908, 624, 650, 938.
11. Wechselman and Meier. Deutsch. med. Wchnschr., 1908, 1340.
12. Eitner. Wien. klin. Wchnschr., 1908, 729.
13. Jundell, Almkvist and Sandman. Centr. f. inn. Med., 1908, 1181.
14. Boehm. Folia Serologia, 1909, 108.
15. Reinhard. München. med. Wchnschr., 1909, 2197.
16. Valerio. Riforma Medica, Naples, January 30, 1911.
17. Halberstaedter, Müller and Reiche. Berl. klin. Wchnschr., 1908, 1917.
18. Treuber. Deutsch. Arch. f. klin. Med., Leipsic, December, 1910.

19. Boas and Peterson. Hospitalstid., Copenhagen, April 19, 1911.
20. Wolfsohn. Deutsch. med. Wchnschr., 1910, 505.
21. Reicher. Deutsch. med. Wchnschr., 1910, 617.
22. Dreyer. Deutsch. med. Wchnschr., April 27, 1911.
23. Richards. Jour. Am. Med. Assn., 1913, 1139.
24. Lassen. Hospitalstid., Copenhagen, December 4, 1912.
25. Hesse. Wien. klin. Wchnschr., January 21, 1915.
26. Sutherland and Mitra. Indian Jour. Med. Res., Calcutta, April, 1915.
27. Verdozzi and Urbana. Policlinico, Rome, 1915, 529.
28. Craig. Jour. Exp. Med., 1911, 521; Med. Herald, February, 1914, 45.
29. Semon. Zentralbl. f. Gyn., 1911, p. 556.
30. Daunay. Pariser geburts. Ges., March, 1911.
31. Zubrycki, Lwowski Tygodnik. Lekarski, 1912, p. 327.
32. Walker and Swift. Jour. Exp. Med., July, 1913, p. 86.
33. Craig and Nichols. Jour. Am. Med. Assn., 1911, 474.
34. Caan. München. med. Wchnschr., April, 1911, p. 731.
35. Browning and MacKenzie. Diagnosis and Treatment of Syphilis, p. 100.
36. Scheidemandel. Deutsch. Arch. klin. Med., 1911, p. 483.
37. MacCormac and Morson. Arch. Middlesex Hosp., 1914, xxxiii, 126.

OBSERVATIONS ON THE OCCURRENCE OF SYPHILIS IN THE UNIVERSITY OF MICHIGAN OBSTETRIC AND GYNECOLOGIC CLINIC

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Fortunately, due to the thorough and exhaustive work of the referenten, the participants in this symposium on syphilis in its relations to obstetric and gynecologic practice can omit introductions and references to the literature, and may confine themselves strictly to their portion of the discussion.

It is only within the past five years, since the discovery of the spirochete and the Wassermann reaction, that syphilis can be said to have been studied to any degree of scientific accuracy in the obstetric and gynecologic clinic in the University of Michigan Hospital. Active cases of syphilis with abundant skin or mucous membrane manifestations were recognized and the proper treatment instituted; but we were quite ignorant as to the extent of latent lues, with the result that many cases passed unrecognized and the patients suffered accordingly. While the system carried out in the University Hospital for the recognition and treatment of syphilis is not without its faults, and no doubt could be greatly improved upon, it has served its purpose as a beginning, and is vastly superior to no system at all.

For the past year there has been a hospital rule that every

in-patient should have a Wassermann taken, and while the rule has not for various reasons been so strictly adhered to as could be wished, its value is gradually becoming realized, so that more and more of such examinations are being made from each clinic. At the present time the hospital serological laboratory is making something like five or six hundred Wassermanns a month, and as the serological records are most accurately kept, data is accumulating from which in time most valuable conclusions can be drawn.

It is the unwritten rule of the hospital that all cases of syphilis be referred, not transferred, to the department of syphilology for examination, advice, or treatment. This is a most fortunate custom, for each case is thus seen by an expert on the disease in question and an authoritative diagnosis is secured. In the same way the treatment is not haphazard, as may be the case when not carried out by a specialist. If the report which is to follow can be considered of any value, it will largely be due to the accurate and careful work of the serological laboratory and the scientific nature of the work emanating from the department of syphilology, of which Professor Udo J. Wile is chief, and to whom I tender my grateful appreciation.

It will remain for others to point out when and how the Wassermann reaction may fail as a test for lues. Undoubtedly it does fail in a negative way, since it is fully recognized that an individual may have the disease and not show the reaction. Yet the test is of undoubted value when positive, and if carried out in a series of cases, is a fair indication of the frequency of the disease, especially if the doubtful cases be checked up by the examinations of an expert.

First, as to the frequency of syphilis in a general hospital as revealed by the Wassermann examination. The results in 2000 cases have been tabulated, excluding patients admitted to the departments of dermatology and syphilology and neurology, since the inclusion of the large number of syphil-

itics in these two services would have interfered with the purposes of the investigation which was to ascertain the frequency of syphilis in average hospital patients.

In 2000 patients there were 110 distinctly positive Wassermanns in which the diagnosis in almost every instance was confirmed by the department of syphilology. Among the doubtful reactions there were 8 in which the patients were afterward proved to be syphilitic. This shows that practically 6 per cent. of the general run of hospital patients are syphilitic. Allowing for the possibility of some luetics giving positive reactions, and that reëxamination of the doubtful cases might have given some positives, it is fair to assume that from 6 to 8 per cent. of the patients in this particular hospital, excluding certain services, were syphilitic.

The percentages varied in the different services, as can be seen by the following:

Obstetrics and gynecology	4.8 per cent.
Medicine	4.7 "
Ophthalmology	8.7 "
Otolaryngology	5.0 "
General surgery, orthopedics, and genito-urinary	4.1 "
Pediatrics	11.0 "

The proportion of syphilitics in this hospital material is, on the whole, rather low. Subsequent reports may show decidedly higher figurs more in agreement with those from other hospitals. Possibly the nature of the hospital material accounts in some measure for the low percentage of syphilis, since the patients are mostly from the country districts. Be that as it may, the figures are presented for consideration as a contribution to the subject under discussion.

Syphilis in the Obstetric Clinic. There were 18 undoubted cases of lues in the 381 obstetric patients examined, or 4.7 per cent. These patients were given the Wassermann test, their histories taken with special reference to

syphilis and all positive and doubtful cases referred for diagnosis to the department of syphilology.

In explanation of this low percentage of syphilis among a class of patients where the ratio apparently should be high, it may be said that it is probably due to the class of patients from which the material is drawn. Although 62 per cent. of the material is made up of illegitimates, the average age of the 381 patients being twenty-three years, as a class the patients have not been unduly exposed to syphilis. They are country girls, waitresses, stenographers, telephone operators, very few being prostitutes or street walkers.

The laboratory reports show the varying degrees of intensity of the Wassermann reaction, its doubtful nature or its absence. Of the 18 undoubtful cases of syphilis there were 12 with 4+, one with 3+, 2 with +, and 2 with ± reactions, while in 1 instance, although a Wassermann was not obtained on the mother, the fetus showed a 3+ Wassermann and the placenta was syphilitic.

History of Lues and Correspondence with the Results of Wassermann Examinations. This is an interesting field for investigation, since it shows that in the majority of instances, even when particular attention is paid to the history, nothing suggestive of syphilis can be found. There was a positive history of luetic infection in 8 of the 18 cases. Of these 5 gave 4+ Wassermanns, 1 a 2+, while 2 were doubtful or ++. On the other hand, where the histories were doubtful in 3 cases, all gave 4+ Wassermanns. In 7 cases the histories were entirely negative as to syphilitic infection, but of these 4 gave 4+ reactions, 2 were 1+, while in 1 case the Wassermann was not obtained, the evidence of maternal syphilis being gained from an examination of the fetus and placenta.

Physical Signs of Syphilis. In only 8 cases out of the 18 syphilitics were there positive signs of lues as revealed

by careful physical examination. Of these 5 gave 4+ Wassermanns, 1 was 3+ while 2 were ++ or doubtful. On the other hand, in 4 cases where the results of the physical examination were doubtful all gave 4+ reactions. In 5 cases there was entire absence of signs of lues on careful physical examination, although in 2 of these cases there were 4+ positive Wassermanns, in 2, the reactions were +, while it was not obtained in 1 case.

This is additional proof of what has long been known that in women in particular there may be few or no signs of syphilis, although from other information undoubtedly the disease is present.

Treatment during Pregnancy and its Effect. The results of treatment of the syphilitic mother and the effects of such treatment upon the child prior and subsequent to birth are of special interest to the obstetrician.

Of the 18 luetics, 14 received treatment, 7 before and 7 after labor, while 4 patients refused treatment. The treatment consisted in varying doses of salvarsan and mercury.

There were 12 full-term labors and 6 premature deliveries among the 18 luetics. All but one of the 6 patients receiving treatment before labor carried their children to full term. Of the other 6 women going to full term, although in all but 2 instances they gave 4+ Wassermanns, the other signs pointed to old infections except in 1 case, where infection took place at the seventh month. Of those receiving treatment with full-term labors, 2 were conceptional infections while the others were infected two to four years previously; 5 of the 6 women who miscarried received no treatment before or during pregnancy. In all except a single case where the infection was old, infection occurred at the time of or very soon after conception.

This is a very good showing for the treatment of syphilitic pregnant women, so far as an aid in carrying her child to full term is concerned, and shows that salvarsan and mercury

are well borne by the syphilitic mother. Exceptions to this statement may be found in the literature, but should not deter us from instituting vigorous treatment with both salvarsan and mercury in our pregnant syphilitic patients.

The Results of Wassermann Examinations on Newborn Infants. It is a routine procedure in the obstetric clinic to collect blood from the umbilical cord in a test tube and send it immediately to the serological laboratory for examination. In no case where the maternal blood in the 381 cases examined gave a negative Wassermann reaction was the newborn infant's reaction positive. In fact, only 3 of the children of the 18 luetic mothers gave positive Wassermann reactions at birth, and these mothers received no treatment during pregnancy. Two babies whose mothers received no treatment during pregnancy, while giving negative reactions at birth, gave positive reactions later at the twelfth and fourteenth week respectively.

Thus it would seem as if treatment of the syphilitic mother during pregnancy had a favorable effect upon the child, although it must not be lost sight of that the manifestations of syphilis may develop later. As it is the rule of the department that no child of a syphilitic mother with or without serological and physical manifestations of the disease shall be sent out for adoption, it will be an easy matter to ascertain the subsequent histories of the children of luetics who gave no evidence of disease when they were discharged from the maternity. This investigation on latent syphilis is now being carried on and will be reported upon later.

Syphilis in the Gynecologic Clinic. The Wassermann test was made upon 390 gynecologic patients; 19 of these patients gave 4+ Wassermann reactions, 1 a 3+ while 2 others with less marked reactions were judged to be luetic, making a total of 22 patients among the number examined.

The average age of these 22 patients was twenty-two years; 16 were married and 6 were single.

A definite history of syphilis was elicited in only 5 of the 22 cases, while in 1 case it was suggestive. In only 1 case was a definite history of lues in the husband obtainable.

The above shows the great importance and value of systematic Wassermann examinations upon gynecologic patients. If such examinations be not employed, local lesions may be attended to surgically and by other methods of treatment, but a far more important general disease will in many cases be overlooked and no attempt made to cure the patients. Wassermann examinations are particularly important in women, since in many instances the diagnosis can only be made in this way, as the local manifestations of the disease are far less marked in women than in men. Many cases puzzling to the gynecologist in the past because of failure to be restored to health may be explained at the present time, since many of them were undoubtedly cases of latent syphilis.

The findings in the 22 luetic patients as reported by the department of syphilology are extremely interesting and show what a great aid is the Wassermann test in the establishment of the diagnosis.

There were 13 cases of latent syphilis, all giving 4+ or 3+ Wassermann reactions, but with few physical findings, in most cases only a slight adenopathy. Certainly such physical signs without the aid of the Wassermann test would have been apt to escape the notice of even the gynecologist most expert in general physical examination.

Another interesting feature about this group of syphilitics with gynecologic conditions was that in no patient was the diagnosis made from an inspection or palpation of the genital organs. Again, in no case from the material submitted to the pathologist was the diagnosis of syphilis made by microscopic examination. Undoubtedly this would not be true of other gynecologic clinics where the lesions of recent acute syphilis predominate, but these are special clinics

and do not represent average gynecologic material. It is also possible that future investigations of the material at our disposal in the light of what will be learned from the discussions at this meeting will enable us to recognize what heretofore has escaped our observation.

Summary and Conclusions. 1. Only by routine Wassermann tests will the obstetrician and gynecologist best serve the interests of his patients.

2. Especially is this true in hospital practice where even careful histories fail to arouse suspicion of latent syphilis.

3. Out of 2000 in-patients in the University Hospital, excluding two services, the proportion of syphilitics was 6 per cent.

4. The nature of the hospital material will determine the percentage of lues, but in the average hospital the ratio will not be far from 8 to 10 per cent. if the entire hospital population be included.

5. The same holds true for the proportion of syphilis in any special clinic, the percentage varying according to the nature of the material.

6. The percentage of lues in 381 cases in the University Maternity was 4.7 as shown by the Wassermann reactions and expert physical examinations.

7. In 18 cases of syphilis among the number examined, only 8 or less than half gave a history of lues.

8. In only the same number (8) were there positive physical signs of lues.

9. As shown by the histories of the 18 cases, there is a greater chance for the syphilitic mother treated by salvarsan and mercury to give birth to a living full-term child than where no treatment be given during pregnancy.

10. The newborn infants of the mothers so treated do not give positive Wassermann reactions, although undoubtedly they are syphilitic, and later probably will show signs of the disease.

11. A certain proportion of the newborn children of untreated syphilitic mothers will give positive Wassermanns.

12. Out of 390 gynecologic patients subjected to the Wassermann test, 22, or 5.6 per cent., gave positive reactions.

13. In only 5 of the 22 luetic patients was there a history of syphilis.

14. Hence, the importance of such examinations or a serious general disease will be overlooked and the gynecologic patient will remain uncured.

SOME REMARKS ON THE RELATIONSHIP OF SYPHILIS TO ABORTION, MISCARRIAGE, AND FETAL ABNORMALITIES

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Syphilis has always been of tremendous importance to those who care for the prospective mother and infant. We should make every effort to understand the effect which it may have upon the maternal and fetal organisms.

The newer means of making more accurate diagnosis of this disease afford us the opportunity for making a more accurate study. Such a study is of special importance to those who are interested in the many problems associated with the reproduction of mankind.

It is extremely important from the standpoint of the infection with this disease of one parent by the other.

It is of the greatest value to know the possibility of transmission from father to offspring, and particularly from the mother to the fetus. The latter is of the very first importance to the obstetrician.

It should be viewed from the standpoint of the effect of the disease on the development of the ovum, and the production of disease in the fetus, with the termination of pregnancy before term, in a stillbirth either premature or at term, or in the birth of a diseased infant, which sooner or later shows signs of congenital syphilis.

In considering the possible ways in which the offspring could be affected, we should have to mention the direct invasion of the ovum or fetus with the treponema pallidum. This might take place from the father or mother. In the former instance, granting the possibility, it would probably mean an early and serious interference with the development of the ovum, producing total destruction; or possibly the development of some of the pathologic ova, which are not uncommonly found in early abortion.

In later stages of gestation, the luetic organisms might produce fatal disease of the fetus, at varying stages of pregnancy; manifestations of disease might be present at, or soon after birth, or the spirochete might remain dormant, to produce the late lesions of congenital syphilis. The direct effect of toxins on the fetus without the presence of these organisms must be considered.

What other possibilities are there aside from the direct invasion of the fetus itself? The growing fetus could be affected indirectly from lesions produced in the chorion or umbilical cord by the organism or its toxins. It could also be affected by syphilitic lesions in the maternal organism, more particularly of the genitalia, and especially by any abnormal condition of the decidua.

I have made no attempt in this study to answer the above-mentioned problems. This is *primarily* a clinical and statistical study, which is far from complete. It seemed that it might be of value when considered as a part of a symposium, combined with the data of other observers in different localities.

It seems to be a common impression that syphilis is a common cause of abortion, miscarriage, and fetal malformations. When one finds a case with a history of these conditions lues is the etiologic factor which first comes to the mind.

In a consideration of actual cases it has been my impres-

sion that syphilis could not be demonstrated in most of these cases. In viewing the literature, suggestions are creeping in that this disease is not such a common cause of the termination of pregnancy in the first six months as is usually supposed. Very little proof is advanced to substantiate these impressions. A few years ago we started making the Wassermann test as a part of the routine examination of patients in the obstetric service of the University of Minnesota Hospital. It seemed that an analysis of these cases might give some indication of the truth or falseness of these impressions.

It is important that we know the effect of syphilis on pregnancy to understand the truth, and if it is not the common cause of abortion and miscarriages we should seek the real etiologic factor. So long as we are satisfied with one explanation of these conditions we will not look for other causes.

It is not possible for me to offer absolute proof but I wish to state my belief that syphilis is not the common cause of abortion, miscarriage, or fetal abnormalities. The relative frequency of abortion and miscarriage is not greater in syphilitics than in non-syphilitics.

Malformations are a little more frequent in children with luetic parents than in those who have not such parentage. On the other hand, as has been demonstrated by a number of observers (Williams and others), premature births and stillbirths are quite frequently due to syphilis—it being the most frequent single cause. My opinion is in accord with these observations and is supported by an analysis of the cases which will now be considered.

The material was collected from the records of cases entering the hospital of the University of Minnesota Medical School. The total number of records studied is 1095. In this series there are 518 primiparæ, 574 multiparæ, and 3 in which the records are not clear. The total number of pregnancies in these cases was 2773. Of these 11 were

multiple, of which 8 were premature, making in all 2784 fetuses and newborn infants.

The pregnancies ended at term in 2422 instances, making a total of 2425 full-term infants. The remainder ended before term, though in five instances the time of delivery was not stated.

The cases are divided into *syphilitic*, those in whom there was a positive Wassermann or other definite evidence of syphilis, *non-syphilitic* in whom the Wassermann was negative and there was no definite evidence of lues, and those in whom no Wassermann test was made and there was no definite evidence of lues.

In a study of these records the cases have been considered as ending at term; prematurely in the last trimester; as a miscarriage in the second trimester, and as an abortion in the first trimester. According to this division there were 197 abortions, 62 miscarriages, and 84 premature births from 68 mothers. In eight instances the period of gestation was too uncertain to be approximated. There were eight pairs of twins. There were three ectopic pregnancies.

In this series there were 76 stillbirths from 66 mothers. Fetal malformations were present in sixteen infants. A positive Wassermann reaction was obtained in 26 cases, in which there were no abortions, miscarriages, premature births, or stillbirths. There were also 5 cases of hemorrhage of the newborn.

The Wassermann reaction was done with the mother's blood 857 times with negative results in 804 cases and a positive reaction in 53. The blood of the newborn was tested 393 times, with a positive reaction in 12, and negative in 381. All questionable and unsatisfactory tests were disregarded.

In the 109 cases which gave a history of abortion there were 13 which gave evidence of syphilis.

There were 621 pregnancies in these cases, 1 of which was

ectopic. Of these 390 ended at term, 15 were premature; there were 13 miscarriages and 197 abortions, with 5 uncertain as to which of the first two trimesters saw the end of the pregnancy. There were 18 stillbirths. There was 1 ectopic pregnancy. The Wassermann reaction was done on the blood of the mother 91 times, and on that of the child 47 times. The mother's blood gave a positive reaction 11 times, and that of the child twice. In 9 instances where the maternal blood gave a positive test, there was none made of the child.

In the 13 luetic cases, there were 74 pregnancies, 23 abortions, no miscarriages, (though there were 5 ending in the first two trimesters), 4 premature births, 1 premature stillbirth, a total of 5 stillbirths and 42 pregnancies ending at term. There were 13 children born to these mothers in the hospital, where they were under observation for ten days or two weeks. Eight of them appeared to be well, 4 gave definite evidence of congenital syphilis, and there was 1 stillbirth apparently caused by syphilis.

There were no malformations in this group of infants born in the hospital, though one of these mothers gave a history of having given birth to a hydrocephalic child.

There were 13 cases, in the group of those who gave a history of abortion, in which there was no evidence of syphilis, and where no Wassermann test was made on either mother or child. There were 83 pregnancies and 32 abortions in these cases. There were 50 babies born at term, 1 premature birth, and 1 stillbirth.

None of the children gave evidence of syphilis while in the hospital. There was no history or evidence of malformations in this group. There was one case of abortion at the third month, in the hospital. There were twelve new born babes. Of these 10 were apparently well, and 1 died of an acute infection. There was one stillbirth resulting from placenta prævia.

There were 83 cases in which the Wassermann was negative in mother or child or both, and in whom there was no definite evidence of syphilis.

These women had 464 pregnancies, 298 of which ended at term, 10 were premature (one set of twins); there were 13 miscarriages, 12 stillbirths, and 142 abortions. There was 1 ectopic pregnancy in this series. There were 40 cases which gave a history of miscarriage. Seven of these gave evidence of syphilis. The total number of pregnancies in these cases was 202, of which 110 ended at term and 11 were premature. There were 62 miscarriages, 14 abortions, and 5 indefinite cases, 4 stillbirths, and 1 malformation.

The mother's Wassermann reaction was positive in 4 instances; negative in 32, and not taken in 4. In the child it was positive in 2 instances, negative in 8, and not taken in 30.

In the 7 cases giving evidence of syphilis there were 27 pregnancies, 10 of which ended at term, and 2 were premature. There were 10 miscarriages and no abortions, though 5 were uncertain as to time. There were 3 stillbirths. Of the 7 deliveries in the hospital, 3 children remained healthy while in the institution, 1 gave evidence of congenital syphilis, and there was 1 stillbirth from a craniotomy. Two terminated at about the fifth month, the fetuses of course dying. There were no fetal malformations. One case in which the newborn developed congenital syphilis had hydramnios.

There were only 3 in whom a Wassermann was not done on either mother or child, and one mother gave definite clinical evidence of syphilis. These cases had 14 pregnancies, 3 miscarriages, 3 premature births, and 8 full-term infants. Three of these were delivered in the hospital, 1 died from a complicated delivery, the other 2 were apparently healthy.

There were 30 cases with negative tests in whom there were 161 pregnancies, 14 abortions, 49 miscarriages, 6 pre-

mature labors, 92 full-term pregnancies and 1 stillbirth. There was 1 hydrocephalic infant born prematurely.

Of the 30 deliveries in the hospital, 2 were miscarriages at the fifth and sixth month, 3 were premature, of which 1 was hydrocephalic, another resulted in twins, both of which died—the cause not being determined; the child from the third mother lived and was apparently well. Twenty-four were delivered at term and left the hospital free from disease; 1 full-term child died from a non-syphilitic condition. There were 68 cases in which premature births occurred; in 6 of these the pregnancy was multiple.

In this group of cases there were 84 premature births in 241 pregnancies; of these remaining 107 went to term, 10 were miscarriages, and 38 ended as abortions. Of the latter, 1 woman admitted a total of 12 induced abortions, and another confessed to 10, which would reduce the number to not more than 15 spontaneous abortions. There were 22 stillbirths and 3 malformations in this group.

The Wassermann reaction was done in 58 cases and not made in 10. There were 13 positive and 45 negative tests. Congenital syphilis was present in 5 of the 50 cases born in the hospital.

There were 50 premature infants born in the hospital. Of these 18 lived and appeared healthy, 13 were stillborn: 4 due to syphilis, 6 from non-syphilitic causes, 3 in which the cause was not determined. There were 19 deaths in the hospital: 5 due to syphilis, 6 from non-specific causes, 8 not determined. There were 3 malformationed infants born in the hospital.

There were in this series 66 cases who had stillbirths in a total of 276 pregnancies, with 47 abortions (22 admittedly induced), 7 miscarriages, 27 premature births, and 195 deliveries at term. There was a total of 76 stillbirths. Malformations were present 3 times, 2 monsters being born to the same mother. The Wassermann reaction was positive

in 10 cases, negative in 49, and not taken in 7. Of these stillbirths 34 occurred in the hospital. Syphilis was present in 4 of these; the stillbirth was due to other causes in 18 instances. The etiology was not determined in 10 cases. Two monsters were stillborn. There were 7 who had more than 1 stillbirth, and of these 2 were syphilitic, 3 questionable, and in 2 cases other causes explained the stillbirth. The fetuses were macerated in 8 cases.

In this series there were 16 fetal malformations born to 15 mothers. There were 66 pregnancies in this group, 6 abortions, 1 miscarriage, 4 premature births, 55 deliveries at term, and 7 stillbirths.

The Wassermann test was done in all but 1, with a positive reaction in 2, 1 of which gave definite clinical evidence of congenital syphilis.

It is interesting to note that there were 2 cases of hydramnios in this series associated with serious malformation—an anencephalic monster and a hydrocephalic infant.

It is also of interest to note that there was only 1 primipara in this series. She gave birth to a child with "club feet." Twelve of these cases were born in the hospital and, as stated above, 1 of them died of congenital syphilis. The infant was premature and had an abnormality of minor importance. Three of the stillbirths were in the hospital, all in cases with major malformations. Of those not occurring there, all but 1 appear to have been in monsters.

There were 26 cases in which a positive Wassermann was obtained, who had no abortions, miscarriages, premature births, or stillbirths. Two of the mothers had syphilis, whose children remained well while they were in the hospital. One child had a slight deformity and also congenital syphilis. Of the children born in the hospital 6 had congenital syphilis, 3 dying in the hospital, while 20 remained apparently in good condition. Seventeen of these cases were primiparæ. Four of the 6 cases of congenital syphilis appeared in these mothers.

	Cases.	Pregnancies.	Term.	Premature.	Miscarriages.	Abortions.	Stillbirths.	Malformations.	Wassermann.			Born in hospital.		Remarks.
									Positive.	Negative.	None.	Well.	Syph.	
Total	1095	2773	2422	84	62	197	76	16	M. 53	804				
	[1]P. 518													
	M. 574													
Abortion:				1:33	1:44	1:14	1:36	1:173	[2]C. 12	381				
Syphilis	13	74	42	1:18 4	0	1:3+ 23	1:15 5	1:74 1	M. 11	80	..	8	4	1 S. B.[3]
Negative Wassermann	83	464	298	1:46 10	1:36 13	1:3+ 142	1:39 12	1:154 3	..	..	..	75	0	
Wassermann not taken	13	83	50	1:83 1	..	1:3− 32	1:83 1	0						
Total	109	621	390	1:41 15	1:48 13	1:3 197	1:34 18	1:155 4	C. 2	45		10	0	
Miscarriage:														
Syphilis	7	27	10	1:5 2	1:3 10	5?	1:9 3	0	M. 4	32	4	3	1	3 S. B.
Negative Wassermann	30	161	92	1:27 6	1:3 49	1:12 14	1:161 1	1:161 1	..	..	..	24	0	1 S. B.
Wassermann not taken	3	14	8	1:5 3	1:5 3	..	−	−	..	..	..	2		
Total	40	202	110	1:18 11	1:3+ 62	1:12 11	1:50 4	1	C. 2	8	30			
Premature:														
Total	68	241	107	1:3 84	1:24 10	1:6 38	1:11 22	1:80 3		13	45	10	18	5	13 S. B.
Stillbirth:														
Total	66	276	195	1:10 27	1:39 7	1:59 47	1:36 76	1:92 3		10	49	7	Non-syphilis 18	4	4 syphilis. 2 ectopic.
Malformations:														
Syphilis	..	170	..	..	..	..	..	1:85 2						
Non-syphilis	..	2457	..	..	..	..	..	1:175 13						
Wassermann not taken	..	146	..	..	..	..	..	1:146 1						
Positive Wassermann	15	66	55	1:16 4	1:66 1	1:11 6	1:9 7	1:4 16		2	12	1		
Hydramnios	11	57	46	1:11 5	..	1:14 4	0	0	..	2	9	..	20	6
							0	0						
							10	1:28 2						

[1] Primiparæ and multiparæ.

[2] Mother and child.

[3] Stillbirth.

The ratios indicate the relationship of the number of abortions, etc., to the total number of pregnancies which had occurred in those cases.

There were 11 cases of hydramnios, in only 2 of which were there fetal malformations, both being monstrosities. All but 2 were multiparæ. There were 57 pregnancies, 4 of which ended in abortion, 2 in miscarriages, 5 in premature labors (2 pair of twins), and 46 labors at term. There were 10 stillbirths, 7 of them in 3 mothers. Three of these occurred in the hospital, none of them due to syphilis. Of the total number of stillbirths 5 occurred in luetic mothers. The Wassermann reaction was positive in 2 and negative in 9 cases.

There were 5 cases of hemorrhage of the newborn; 1 child was definitely syphilitic with positive evidence in the parents. In another case the father was syphilitic, the child was probably syphilitic.

I wish to express my thanks to Dr. W. P. Larson for his careful work in making the numerous Wassermann tests.

I am extremely grateful to Dr. Elizabeth Barnard for many hours of careful scrutiny of case records.

SUMMARY. 1. There were 1095 cases in whom there was a history of 2773 pregnancies, of which 2422 ended at term.

2. There were 109 cases who had 197 abortions in a total of 621 pregnancies or approximately 1 abortion to 3 pregnancies.

3. In the non-syphilitic and negative Wassermann group there were 83 cases with 142 abortions in 464 pregnancies, or about 1 to 3.

The 13 syphilitic cases had 23 abortions in 74 pregnancies, or about 1 to 3. Apparently syphilis is not a very potent factor in producing the termination of pregnancy during the first trimester.

4. There were 40 cases who had 62 miscarriages in a total of 202 pregnancies, or about 1 to 3.

There were 30 cases without evidence of syphilis in whom there were 49 miscarriages in 161 pregnancies, or nearly 1 in 3. In 7 cases with indications of Lues there were 10

miscarriages in 27 pregnancies, or a little more than 1 to 3. This indicates that syphilis is not responsible for any high percentage of miscarriages.

5. When we consider the premature births in this series we find about one-third of the mothers giving evidence of syphilis. About 20 per cent. of the premature infants gave positive evidence of luetic infection.

6. About 10 per cent. of the mothers who had stillbirths gave positive Wassermann reactions. Of the stillbirths in the hospital 12 per cent. were proved syphilitic.

7. Two of the 16 malformed infants were born to syphilitic mothers. This is a higher ratio for those having syphilis than for those who did not.

8. Syphilis was proved in 2 of 5 cases of hemorrhage of the newborn.

FETAL AND PLACENTAL SYPHILIS: A LANTERN DEMONSTRATION

By E. D. Plass, M.D.
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(By Invitation)

Introduction. The importance of syphilis in obstetrical work is attested by the fact that your Society has chosen it as one of the subjects for discussion at this meeting. The disease is so prevalent and its manifestations so diverse that exact diagnosis is of paramount importance, and every method which is of value should receive consideration. Since Wassermann demonstrated the possibilities of diagnosis by the complement-fixation phenomenon there has been a tendency to neglect the other methods of study and base the diagnosis upon the serological findings alone. Fortunately, in obstetrics, we have available one and in some cases two other methods of laboratory investigation which are perfectly reliable, and it is to these recently neglected possibilities that I would call your attention.

The fact that the placenta of a syphilitic child differs from the normal has long been recognized, but the lesions which we now consider practically specific were first accurately described by Fraenkel in 1873. For many years these histopathological changes offered the only laboratory confirmation of the clinical findings unless, perchance, the child died and an autopsy was permitted. With the discovery of the Treponema pallidum by Schaudinn and the development of the silver impregnation method of demonstrating

these organisms in the tissues by Levaditi, an additional method of study was made possible.

Placental Syphilis. Grossly the syphilitic placenta differs quite markedly from normal. The most characteristic change is the increase in size and weight. Whereas the normal organ weighs only about one-sixth the weight of the child, the ratio in fetal syphilis is one-fourth to one-third. This increase in weight is due in part to cellular proliferation and in part to edema. The maternal surface has a rather peculiar grayish-pink, greasy appearance and the tissue is more friable than usual. A positive diagnosis can rarely be made from the gross appearance alone; but frequently the changes are marked enough to excite strong suspicion.

The more characteristic histopathological changes are dependent upon an obliterative endarteritis and endophlebitis which are direct manifestations of the syphilitic infection. These changes can frequently be demonstrated in the freshly delivered placenta merely by teasing small portions in water or normal salt solution and examining under the low power of the microscope. In the normal organ the villi are delicate and there are numerous branches which are approximately the same caliber throughout their length. With the light largely cut off the cellular structures can be distinguished and the widely separated stroma cells differentiated. By allowing somewhat more light to come through the diaphragm the bloodvessels can be distinctly made out unless the teasing has washed out the blood, in which case they are visible only with difficulty. By clamping the cord immediately the child is born, the vessels throughout the placenta remain markedly distended, and by properly regulating the light aperture they can be followed in their entire course. Fig. 1, which is a drawing of a villus thus prepared, shows the characteristics very graphically. In an endeavor to show the course of the blood, the arterial side of the system was made somewhat darker than

the venous; but under the microscope no such differentiation is possible.

In the teased syphilitic placenta (Fig. 2) the terminal villi are of somewhat larger caliber and tend to be clubbed at the ends. In some specimens this is much more marked than in the illustration, and should always be viewed as suspicious. It is also to be noted that the stroma cells are more numerous and that the entire villus appears more cellular than normal. The bloodvessels are entirely absent in the terminal villi and in the smaller stems.

This method of diagnosis is crude when compared with the study of fixed and suitably stained sections, but with practice it is possible to obtain fairly close agreement. The only advantage of the method is that since no preparation is needed a diagnosis can frequently be made immediately.

For the purpose of better histological study the placentæ are fixed in a 4 per cent. aqueous solution of formaldehyde (10 per cent. formalin), imbedded in celloidin or paraffin, and cut in sections 10 to 15 microns thick. For routine work they are stained with hematoxylin and eosin and mounted in Canada balsam. The examination is made under the low power of the microscope.

The normal placenta is pictured in Figs. 3 and 4. The former is a low-power drawing and indicates the usual appearance. It is to be noted that the villi are small and that the bloodvessels are very numerous, taking up about one-half of the total cross-section of each villus. The stroma cells are relatively few in number, and there is a single layer of epithelial cells. The high power photomicrograph, Fig. 4, merely accentuates the essential features already described.

The syphilitic placenta offers many points of difference. Fig. 5, a low-power drawing of such a placenta to the same scale as Fig. 3, well illustrates the characteristic differences in structure. The villi are generally much larger and more

closely packed together, with a consequent diminution of the intervillous blood space. The stroma cells have undergone a rapid proliferation and are closely packed, while the epithelial cells retain their usual arrangement. The bloodvessels have almost entirely disappeared, small vessels being present in only two of the larger villi. Fig. 6 is a high-power photomicrograph showing a similar picture.

While the differences between the normal and the syphilitic organs are usually as marked as shown here, there are cases where this is not so, and there is a reasonable doubt as to the specificity of the changes encountered. The process does not uniformly affect the placenta at first, and occasionally the villi from one stem may show definite changes while the neighboring villi are normal. For this reason it is desirable to use a fairly large section ($1\frac{1}{2}$ x $1\frac{1}{2}$ cm.) for study, and sometimes several sections from different portions of the placenta may be necessary. In such cases, even when apparently typical changes are demonstrated in some particular area, one can merely say that the picture is suggestive of syphilis, a diagnosis being made only in the light of the other clinical and laboratory findings. Again, there may be all gradations in the severity of the pathological changes, with a resultant picture somewhere between the normal and the definitely luetic, and here a positive diagnosis is again impossible without other evidence. Among the 75 placentæ herewith reported the diagnosis was doubtful in only 6, or 8 per cent.

We believe that the changes named are specific if noted in the placenta during the last trimester of pregnancy, but before that time the usual picture of the developing organ may be very confusing. The normal early placenta presents a picture which may not be distinguishable from the advanced luetic organ. The villi are large and filled with rather loosely packed stroma cells. Bloodvessels are not visible because they have not yet grown down into the villi.

Not infrequently, however, careful search will reveal some epithelial cells of the Langhans layer still remaining, and thus make possible the diagnosis of an early placenta. In Fig. 7 such an early placenta is pictured, and in the villus at the top the two epithelial layers can be distinctly seen. In the cases where this evidence of prematurity is not available the history should be carefully considered, and where the child is of less than seven lunar months' development (35 cm. long) one should not attempt a positive diagnosis from the histological picture alone.

One other point in differential diagnosis, which may occasionally present itself, is in the placenta of a dead non-syphilitic child. Here, Fig. 8, we have villi which are normal in size or only slightly enlarged. The stroma cells have in large part undergone hyalinization and the few remaining ones are widely separated. The bloodvessels are no longer present, and no trace of them remains. The epithelial cells have undergone considerable proliferation, and in many places the single syncytial layer has been replaced by a stratified one several cells thick. Cross-sections of these syncytial buds give rise to many so-called placental giant cells, and the presence of large numbers of these structures would suggest a non-syphilitic dead child. We have never known the placenta of a syphilitic child to present this appearance, and believe that lues can be excluded when these changes are present.

Changes in the placentæ from patients suffering from nephritis, toxemia, and eclampsia have been reported as presenting lesions indistinguishable from those seen in syphilis. While we cannot deny that such a thing is possible, we can say that it must be exceedingly rare, for in our experience there is nothing in the great majority of these placentæ to suggest syphilis unless there is some other evidence of the disease.

The Treponema pallida are present in the syphilitic

Fig. 1.—Normal villi teased out in water (low-power drawing).

FIG. 2.—Syphilitic villi teased out in water (low-power drawing). (Williams.)

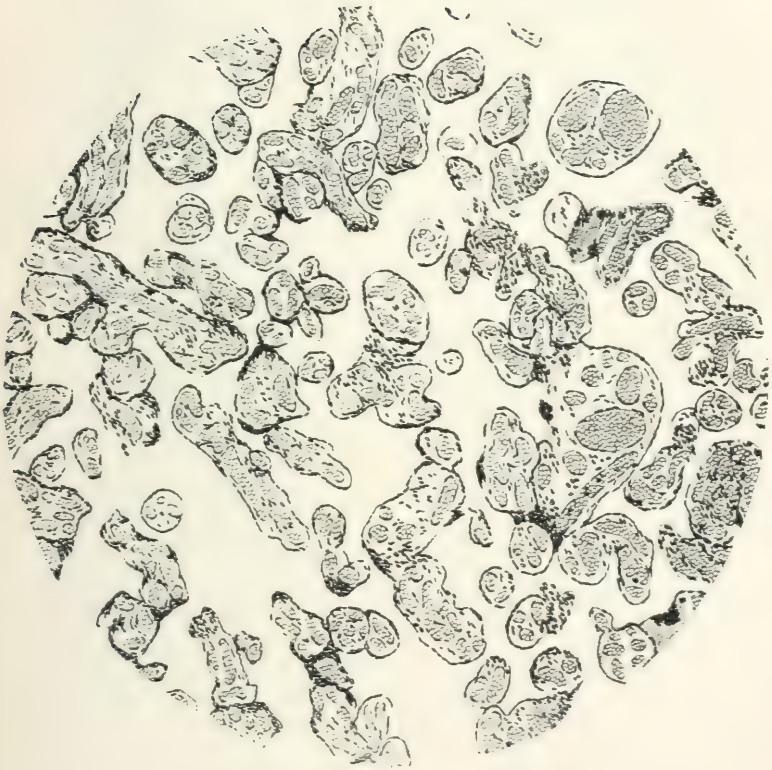

FIG. 3.—Normal villi, cross-section (low-power drawing). (Williams.)

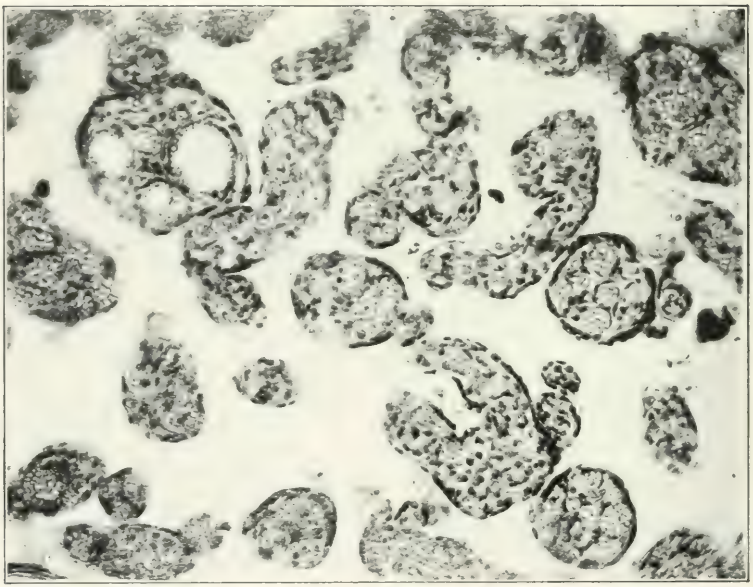

FIG. 4.—Normal villi, cross-section (high-power photomicrograph).

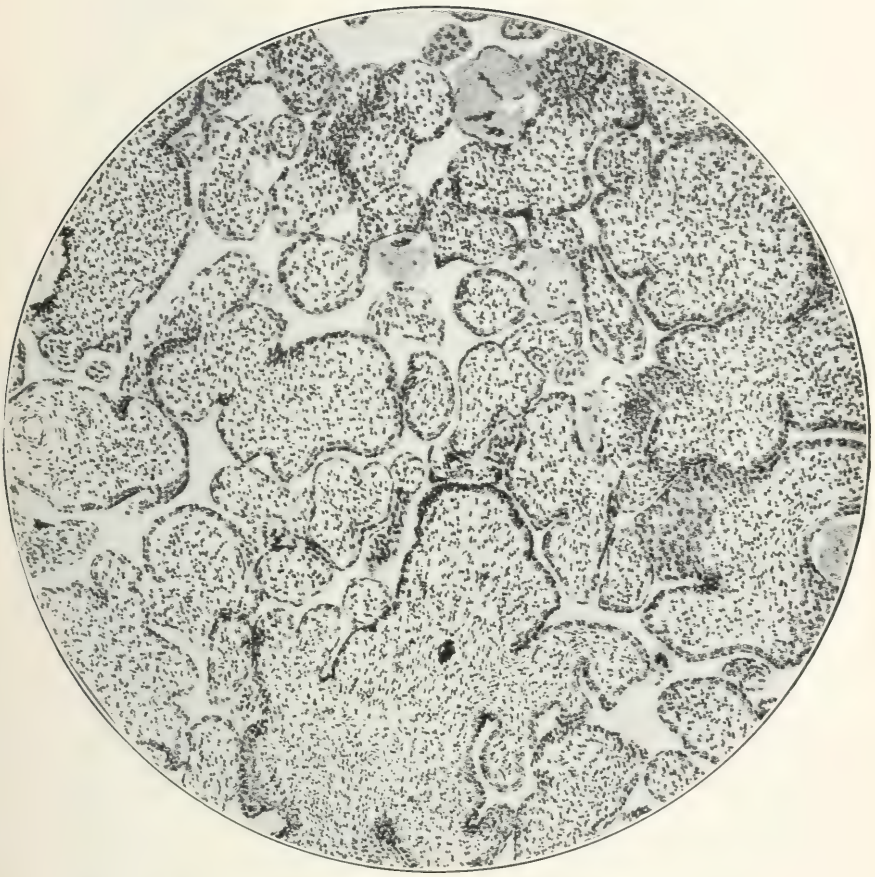

Fig. 5.—Syphilitic villi, cross-section (low-power drawing). (Williams.)

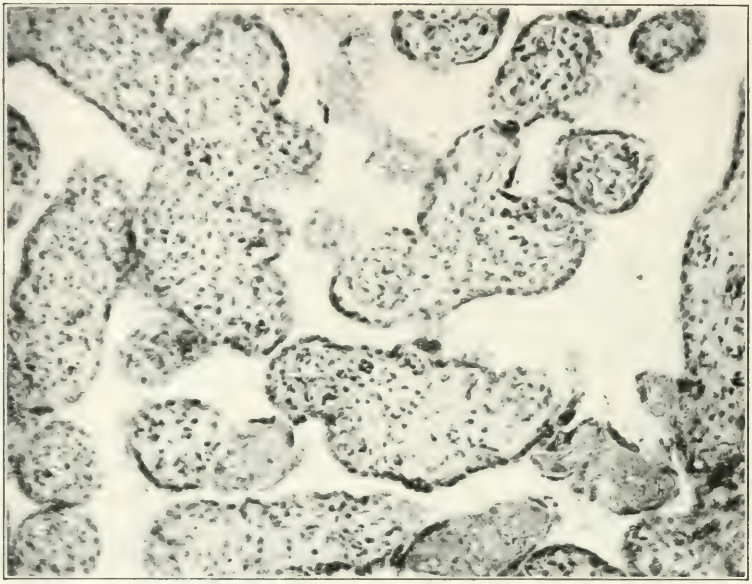

Fig. 6.—Syphilitic villi, cross-section (high-power photomicrograph).

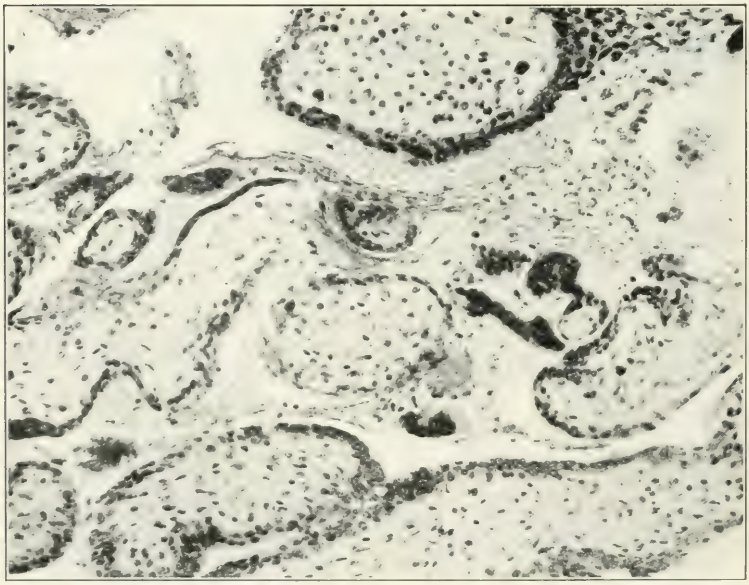

Fig. 7.—Normal early placenta, cross-section (high-power photomicrograph).

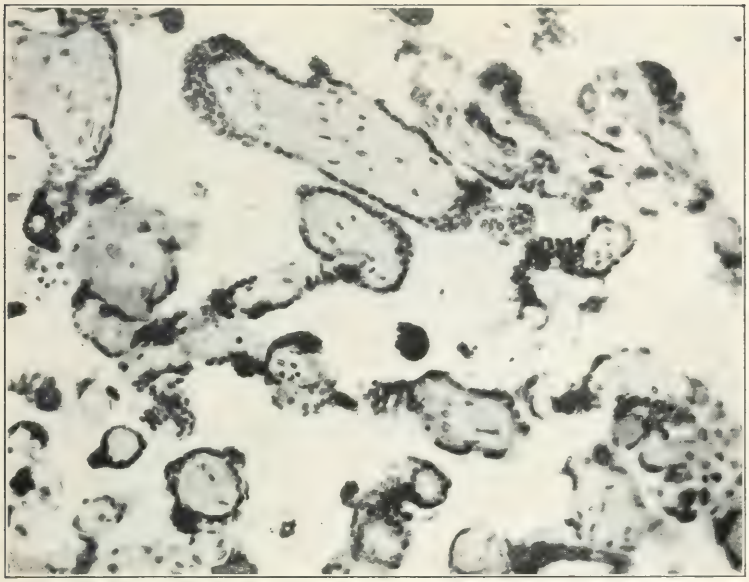

FIG. 8.—Placenta of dead non-syphilitic child, cross-section (high-power photomicrograph).

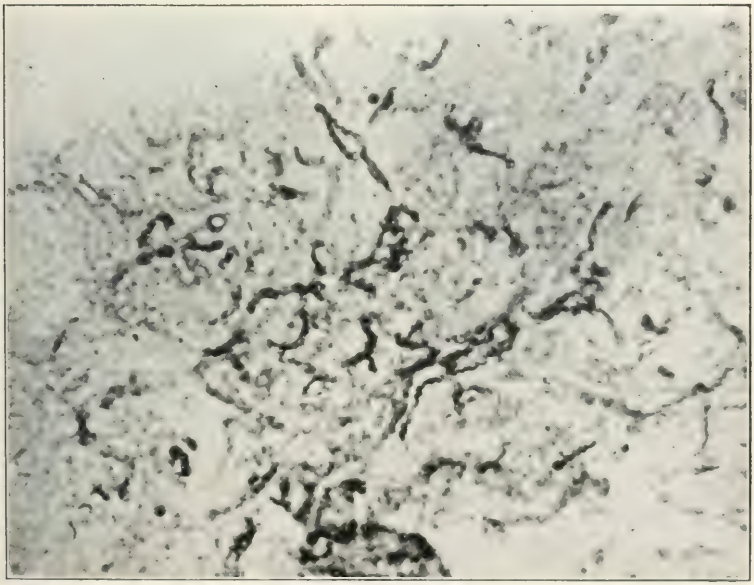

FIG. 9.—Spirochete pallida in lung of macerated fetus. Levaditi stain (oil-immersion photomicrograph).

placenta in such small numbers that they can be demonstrated, if at all, only after a prolonged search. The time required for such a careful study is too great to make the method applicable for routine work.

The possibility of making a definite diagnosis of syphilis from the histopathological changes in the placenta has been subject to argument for years without the specificity of the changes being universally conceded. We feel, however, that when the changes which have been described are present they furnish very strong evidence of the presence of lues, whereas a normal histological picture does not exclude the possibility of the disease.

Fetal Syphilis.[1] In those cases where the child dies and comes to autopsy a further diagnostic possibility is available—the demonstration of the Spirochaete pallidum in the tissues. The method is comparatively simple, and when positive results are obtained one can say with certainty that the child had syphilis, irrespective of any and all other evidence. This demonstration of the causative organism is the one absolute method of diagnosis, and it furnishes an excellent opportunity to control the other tests.

The tissues are best stained by the Levaditi method or some modification thereof. I have found the following technic satisfactory: (1) Fix in 10 per cent. formalin (4 per cent. formaldehyde) for two days or more; (2) place in 80 per cent alcohol for twenty-four hours or more; (3) wash in distilled water for twenty-four hours, changing the water several times; (4) place in 1 per cent. to 2 per cent. silver nitrate solution for three days in the dark at room temperature and for seven days in the thermostat at 37° C.; (5)

[1] The usually described changes in the organs in congenital syphilis furnish excellent evidence of the disease when they can be demonstrated, but frequently the characteristic lesions cannot be made out, and in the cases where maceration has begun, routine histological work reveals nothing.

wash in distilled water for five minutes, using at least three changes of water; (6) place in the following solution for twenty-four hours at room temperature in the dark: pyrogallic acid 3 grams, formalin (40 per cent. formaldehyde) 5. c.c., and distilled water 100 c.c. (always make up fresh just before using); (7) wash for twenty-four hours in several changes of distilled water; (8) run through the usual solutions and imbed in paraffin. Cut sections 3 to 6 microns thick, and after fixing to the slide, remove the paraffin and mount in Canada balsam. Examine under an oil-immersion lens. In correctly treated preparations the spirochetes are dead black in color and the surrounding tissues are a pale yellow. Not infrequently some of the connective-tissue fibrils and more rarely the cell membrane will appear black because of a deposit of the silver, and may be very confusing. With care and a little experience, however, one can usually differentiate these artifacts from the spirochetes by the fact that the latter show regular spirals of a remarkably constant size. If the tissues are not macerated the section can be stained with Toluidin blue in order to bring out the cellular structures more sharply.

According to general experience the spirochetes are most numerous in the adrenals, lungs, and liver, and the search may well be confined to these organs. The organisms usually tend to invade the connective tissue by preference, and when they are rather few in number can best be sought in the walls of the bloodvessels or in the connective-tissue network of the organ. If, as particularly happens in macerated fetuses, the spirochetes are very numerous they are rather diffusely scattered, with here and there groups or colonies showing scores of organisms in a single field of the microscope. A differentiation of the type of spirochetes is not considered necessary because no other spirillum is commonly present in the fetal tissues. A positive finding of even a single organism is of the utmost importance diagnostically, but

the failure to demonstrate the spirochetes has much less value and should not deter one from making a positive diagnosis from other findings. The difficulties of the search are such that at best only an infinitely small portion of an organ can be carefully examined, and when the organisms are very few in number they may readily be missed.

Results in 75 Cases. During the past four years I have done autopsies on 75 babies dead from all causes and have studied the organs for the presence of the spirochete and the placentæ for the histological evidences of syphilis. In 47 of the cases the Wassermann reaction was determined on the maternal serum. Table I shows the results of the observations on the placentæ and the fetal organs and Table II cites the results of comparison with the Wassermann test.

Table I—Results in Placentæ and Fetal Organs

Placentæ

	Macerated.	Not macerated.	Born alive.
Placenta normal	19	10	13
Placenta syphilitic	21	2	4
Placenta suspicious	2	4	0
	42	16	17

Fetal Organs

	Macerated.	Not macerated.	Born alive.
Spirochetes not demonstrated	19	11	11
Spirochetes demonstrated	23	5	6
	42	16	17

In Table I it is seen that there is a close agreement in the number of positive findings in the placentæ and in the fetal tissues. A syphilitic placenta was noted in 27 cases and in 6 other cases it was suspicious, whereas spirochetes were demonstrated 34 times. The two methods did not give absolutely parallel results, as can be seen in Table II.

Among 42 macerated fetuses there were 23 which were definitely syphilitic, a percentage of 54.8. This differs considerably from the usual statement that 80 per cent. of macerated fetuses are luetic.

TABLE II—COMPARISON OF THE WASSERMANN REACTION WITH THE PLACENTAL AND TISSUE FINDINGS

	No. of cases.	W. R. +	W. R. −	W. R. not done.
Placenta normal, spirochetes not demonstrated .	35	8	15	12
Placenta normal, spirochetes demonstrated . .	6	0	3	3
Placenta syphilitic, spirochetes not demonstrated	3	2	0	1
Placenta syphilitic, spirochetes demonstrated .	25	13	2	10
Placenta suspicious, spirochetes not demonstrated	3	2	1	0
Placenta suspicious, spirochetes demonstrated .	3	1	0	2
	75	26	21	28

From Table II one can see how closely the placental pathology agreed with the presence of the spirochetes and with the maternal Wassermann reaction. Excluding the 6 cases in which a positive diagnosis was not made on the placenta, the first two methods agree absolutely in 60 (35 normal and 25 syphilitic). The cases with syphilitic placentæ and no demonstrated spirochetes (Nos. 28, 31, and 56) may well have represented the class in which longer search would have been successful; whereas the 6 cases with normal placentæ and demonstrated spirochetes (Nos. 8, 10, 12, 13, 15, and 41) represent the small percentage of cases in which there are no demonstrable lesions in the placenta in spite of definite fetal syphilis. In the series there were 9 cases of toxemia and eclampsia, 4 of them definitely of the nephritic type, and in none was the placenta even suspicious.

The Wassermann reaction was performed on the mother's blood in 47 cases and the results show rather wide discrepancies when compared with the other findings. Thus in 23 cases in which the placenta was normal and the spirochetes could not be demonstrated the Wassermann was positive in 8 cases. We believe that the histological evidence in these cases should receive some consideration, and that

the positive complement-fixation in the mother's serum does not prove that the child had syphilis. Some substantiation of this skepticism is offered by the fact that in one case the father and in 4 cases the baby gave a negative reaction, and that one other mother had a toxemia which is recognized as sometimes giving a positive reaction in the absence of lues. We do not believe that a negative test is proof of the absence of syphilis, but, taken with the other findings, it makes us doubly certain that these children at least did not have syphilis. The tests were made on cord blood, which we believe to be wholly fetal in origin, and consequently of some value. The Wassermann on the fetal blood was done only in 10 cases, but it is interesting that it always gave a result which was confirmed by the presence or absence of spirochetes.

In 3 cases in which the placenta was suspicious and the spirochetes were not demonstrated (Nos. 3, 24, and 63) the Wassermann reaction was of considerable value in determining the diagnosis. In 2 cases it was negative while the third (No. 63) it was positive, but the negative fetal reaction indicated that the child probably did not have syphilis. In the 2 cases with a luetic placenta and a positive reaction, but no demonstrated spirochetes (Nos. 28 and 31), further search would probably have revealed the organisms. Case 27 is of interest because of the excessively large placenta, 2120 grams, which showed no histological evidence of syphilis. The presence of chronic nephritis in the mother may offer an explanation for the huge growth of the organ.

Case 42 is interesting in view of Colles's law. Here all the examinations of the fetus showed the presence of syphilis, but the maternal Wassermann was negative. Cases 61, 62, 68, and 74, with positive maternal Wassermann reactions and negative fetal reactions, coupled with normal placentæ and no demonstrable spirochetes in the fetal tissues, present the opposite picture.

Table Showing Results in Individual Cases.

Series No.	Service No.	Obstetrical history.				Child.			Placenta.		S. P. in tissues.	Wassermann reaction.				
		Term.	Prem.	Misc.	Abort.	Weight.	Length.	Condition.	Weight.	Mx.		Mat.	Fetal.	Amn. fluid.	Pat.	
1	O-5501	2	1	0	0	2200	41.5	Mac.	670	+	+	..	..	..	..	Lues contracted from second husband.
2	H-5374	0	0	0	0	1600	36.0	d. 1½ h.	770	+	+	+	+	..	..	Secondaries six months ago.
3	H-5376	1	0	0	0	3200	49.0	Mac.	520	?	−	−	−	..	..	
4	O-5518	1	0	0	0	2440	43.0	Mac.	730	+	+	..	..	..	..	First child dead.
5	O-5517	4	0	0	0	500	27.0	Mac.	150	?	+	..	..	..	..	Second child was S. B.
6	H-5386	4	0	0	0	2010	47.0	Mac.	500	+	+	..	..	..	..	Last child was S. B. Secondaries two years ago.
7	O-5524	0	0	0	0	675	32.0	d. 2 d.	180	0	−					
8	H-5403	1	0	0	0	3100	50.0	Mac.	500	0	+	−	..	..	..	First child dead. This child first of twins.
9	O-5530	0	0	0	0	1660	37.0	Mac.	530	+	+	..	+			
10	H-5405	2	0	0	0	2500	44.0	Mac.	350	0	+	−	..	..	..	Luetin reaction on mother negative.
11	O-5535	0	0	0	0	620	30.0	S. B.	300	?	+					
12	O-5536	2	0	0	0	1100	36.0	d. 30 m.	430	0	+					
13	H-5419	0	1	0	0	2500	46.0	d. 1 h.	580	0	+	..	..	..	..	Secondaries one year ago.
14	O-5562	2	0	0	0	1360	38.0	S. B.	325	+	+					
15	O-5549	0	0	0	0	2625	48.0	S. B.	530	0	+					
16	O-3480	0	0	0	0	920	?	Mac.	350	+	+					
17	H-6724	2	0	0	0	840	29.0	S. B.	210	0	−	..	..	..	..	Premature separation of placenta.
18	O-6593	0	2	0	0	?	46.0	Mac.	500	+	+					
19	H-6804	1	0	0	0	2920	49.0	Mac.	560	?	+	+				
20	O-6605	0	0	0	0	3240	47.0	S. B.	490	0	−					
21	H-6827	0	1	0	0	1800	47.0	Mac.	360	+	+	+				
22	H-6838	1	0	1	0	3380	52.0	S. B.	?	0	−	−	..	..	..	Spontaneous rupture of uterus.
23	O-6654	0	3	0	0	2150	47.0	Mac.	400	+	+	+				
24	H-6829	5	0	0	0	2175	45.0	d. 4 d.	390	?	−	−	..	..	..	Atelectasis.
25	O-6668	2	0	0	0	2040	49.0	Mac.	580	+	+	+				
26	O-6671	2	0	0	0	500	25.0	Mac.	200	+	+	+				
27	H-6896	8	0	3	1	3110	46.0	Mac.	2120	0	−	−	..	..	..	Chronic nephritis.
28	O-6680	1	3	0	0	1925	45.0	Mac.	770	+	−	+				
29	H-6932	0	0	0	0	2600	50.0	Mac.	510	0	−	+				
30	H-6872	0	0	0	0	1930	49.0	Mac.	500	+	+	+				
31	H-6863	7	0	0	0	765	34.0	d. 10 m.	240	+	−	+				
32	H-7009	0	0	0	0	3300	54.0	Mac.	450	0	−	..	..	..	..	Eclampsia.
33	O-6795	9	0	0	0	680	32.0	Mac.	?	0	−	−	..	..	−	
34	O-6805	0	0	0	0	3060	50.5	d. 30 m.	690	0	−	..	..	..	..	Breech extraction.
35	O-6818	0	0	0	0	900	27.0	Mac.	290	0	−	−				
36	O-6839	1	0	0	0	2380	50.0	d. 10 m.	390	0	−	..	..	..	..	Chronic nephritis.
37	H-7135	0	0	0	0	3620	55.0	Mac.	480	0	−	−	..	..	..	Hydrocephalus.
38	H-7188	6	0	0	6	120	19.0	Mac.	90	0	−	−				
39	O-6922	0	0	0	0	2265	47.0	d. 3 h.	440	0	−					
40	H-7190	0	0	0	0	3190	52.0	S. B.	?	0	−	−	..	..	..	Premature separation of placenta; toxemia

41	O-6909	0	1	0	0	1700	40.5	d. 24 h.	390	0	+	−		+		
42	H-7205	0	0	0	0	1540	42.0	Mac.	480	+	+	−	..	+		
43	H-7218	0	0	0	0	2320	48.0	Mac.	530	+	+	−				
44	H-7208	2	4	0	0	3000	49.0	Mac.	680	+	+	Anti-comp.	..	−		
45	H-7222	5	0	0	1	1040	36.0	S. B.	375	0	−	−	..	..	..	Chronic nephritis.
46	O-6900	1	1	0	0	1470	39.5	d. 1 d.	520	+	+					
47	O-6789	3	2	0	0	920	34.0	Mac.	500	+	+	+	?	..	+	
48	O-6791	2	2	0	0	3070	52.0	Mac.	600	0	−	+	..	..	−	
49	H-7094	0	0	0	0	1040	37.5	Mac.	215	0	−	+	..	..	..	Pre-eclamptic toxemia.
50	O-6832	5	0	1	0	1020	27.0	d. 2 d.	310	+	+					
51	O-6800	2	0	0	1	4985	58.0	S. B.	790	0	−					
52	H-7001	0	0	0	0	2340	44.0	Mac.	480	0	−	..	..	..	..	Eclampsia.
53	H-7139	6	1	1	0	3740	53.0	Mac.	760	0	−	−	..	..	..	Eclampsia.
54	H-7137	0	0	0	0	1450	44.5	Mac.	200	0	−	..	..	..	..	Toxemia.
55	H-7150	0	0	0	0	3540	51.0	Mac.	520	0	−	−				
56	H-7141	5	1	0	0	1075	38.0	d. 5 h.	350	+	−					
57	H-7458	0	1	0	0	2550	47.0	Mac.	460	+	+	+	+	..	+	
58	H-7447	0	0	0	0	3510	54.0	d. 11 d.	620	0	−	..	..	..	..	Bronchopneumonia.
59	O-7149	1	0	0	0	1810	35.0	Mac.	300	+	+	+				
60	O-7162	0	1	1	0	1360	40.0	Mac.	420	+	+	+	Anti-comp.	−		
61	O-7166	4	0	2	0	3625	50.0	d. 1. d.	590	0	−	+	−	−		
62	H-7480	1	0	0	0	1500	?	d. 15 d.	370	0	−	+	−			
63	H-7515	1	0	0	0	375	26.5	d. 30 m.	150	?	−	+	−			
64	H-7516	0	1	0	0	?	?	d. 10 m.	975	+	+	+	+			
65	H-7495	0	1	0	0	2310	?	Mac.	575	+	+	+				
66	H-7483	1	2	0	0	1600	36.0	Mac.	230	+	+	+				
67	H-7528	1	0	0	0	1750	?	S. B.	500	0	−	..	..	..	..	Destructive operation.
68	H-7552	2	2	0	0	260	24.0	S. B.	100	0	−	+	−	..	+	
69	H-7541	1	0	1	0	2900	?	Mac.	500	0	−	+	..	Anti-comp.		
70	H-7547	1	1	0	0	5000	?	Mac.	850	0	−	+	laked	Anti-comp.		
71	O-7157	4	1	6	0	50	7.5	S. B.	50	0	−	−	..	..	−	
72	O-7213	1	0	3	0	1130	35.0	S. B.	240	0	−	−	..	..	−	
73	H-7569	1	2	1	4	200	18.0	Mac.	100	0	−	−	..	..	−	
74	H-7568	1	0	0	0	1580	42.0	d. 12 h.	420	0	−	+	−			
75	H-7571	0	0	0	0	2650	48.5	d. 4 d.	530	0	−	−	..	..	−	Tracheo-esophageal fistula.

Key to abbreviations:

O = Out-patient number or normal.
H = House number.
Prem. = Premature labor (7–9 months).
Misc. = Miscarriage (4–7 months).
Abort. = Abortion (up to 4 months).
Mx. = Microscopic examination.
S. P. = Spirochete pallida.
Mat. = Maternal.
Amn. = Amniotic.
Pat. = Paternal.
Mac. = Macerated.
d. 1½ h. = died after 1½ hours.
S. B. = Stillborn, not macerated.
? = Doubtful or not recorded.
+ = Positive or syphilitic.
− = Negative or not found.

Conclusions. 1. The syphilitic placenta is characterized by increased size and weight, abnormal proliferation of the stroma cells, and an obliterative endarteritis and endophlebitis. For practical purposes the changes are specific and offer strong evidence of the presence of fetal syphilis, whereas their absence does not exclude the disease.

2. The demonstration of the Treponema pallidum in the fetal tissues affords an absolute diagnosis of lues, but the failure of demonstration proves nothing.

3. There are many discrepancies between the histopathological findings in the placenta and fetal tissues and the maternal Wassermann reaction, and we believe that the complement-fixation test on the mother is of less value in accurately diagnosing fetal syphilis than the other two methods.

4. The diagnosis of fetal syphilis should be attacked from all points, and absolute reliance should not be placed upon any one method of diagnosis.

DISCUSSION ON THE PAPERS OF DRS. DAVIS, POLLITZER, GELLHORN AND EHRENFEST, WILLIAMS, BUHMAN, PETERSON, ADAIR AND PLASS

Dr. J. Whitridge Williams.—I have been interested in the subject of syphilis ever since I have had charge of the obstetrical service in Baltimore. From that time, every placenta which has gone through my hands has been examined microscopically, and we have in this way made a diagnosis of syphilis with great accuracy and satisfaction to ourselves long before the Wassermann reaction was discovered and long before the spirochete was known.

One of the things which interested me in Dr. Pollitzer's paper was the positive stand he took against Colles's law. Colles's

law is the dictum which states that a normal woman may have syphilitic children by a syphilitic father and be immune to syphilis herself, and as Dr. Pollitzer has told you, before the Wassermann reaction was discovered that was generally believed, but after the Wassermann reaction was discovered, and it was found that the great majority of the women representing Colles's law had a positive Wassermann, the question arose how could that be explained? It meant this that these women had latent syphilis, or it meant something was transmitted to them through the fetus which gave a positive Wassermann. In Germany the position was taken that these women had latent syphilis; therefore, the syphilitic children did not occur from the fathers at all, but from the mothers, and the Germans came out with articles entitled "away with Colles's law," and the tendency has been in the last few years to deny Colles's law absolutely. I am not prepared to express a definite opinion on this subject, but I think the tendency to do away with Colles's law entirely is probably a step in the wrong direction. Everyone who has studied syphilis in connection with obstetrics must admit that the validity of Colles's law has been markedly impaired by the finding of positive Wassermanns in the mothers. Those who deny its possibility have likewise gone too far.

I had hoped in the paper I was to present to say something on this subject and say it with authority. Unfortunately, I am not quite ready, and I cannot speak with the authority I would like at this time. Colles's law sometimes holds, although it holds much more rarely than is ordinarily thought or believed in the past. Why do I say that? I say it for the reason that in the series of cases I have had, I can find a number in which we got a syphilitic baby, and we got not only a positive placenta, but we got a positive fetal Wassermann, and where the baby died we got spirochetes in the liver. In several cases we got a negative paternal and positive maternal so that in these few cases there is, at least, presumptive evidence that Colles's law may still hold.

A number of years ago I had a case which showed me this matter in a very definite light and that case was the following:

A colored woman, who had changed her name on several occasions, had a very unique obstetric experience. She had seventeen full term labors, all but two of which occurred in my

service. This woman had sixteen babies because she had twins once under my observation. The first two labors occurred elsewhere. She then had three perfectly normal labors, large babies, normal placenta. Her sixth pregnancy resulted in double ovum twins, one child being born alive, and had a perfectly normal placenta, while one child was born dead, had a syphilitic placenta, and the autopsy made by a pathologist showed a diagnosis of congenital lues. That accounts for six of her pregnancies. Following the twin pregnancy she had eleven other babies in my service; every baby was born alive; every baby weighed over eight pounds because she had unusually big babies, and every placenta was normal. This syphilitic baby was the only one which died either at the time of labor or in the first two years of life.

When we came to inquire into the woman's history, which was a very interesting one, we found that she was perfectly frank in saying that she had sexual intercourse with a lover at the same time that she had sexual intercourse with her husband, and when we traced the lover's history we found he was a syphilitic under treatment in the Genito-Urinary Dispensary, we, with certain diffidence, affirm that it is our belief in this case the woman had an example of superfecundation by her husband, her normal man, her normal partner, and the syphilitic lover was the father of the syphilitic child. That woman never presented any sign of syphilis after a Wassermann test. We got repeated Wassermanns and they were constantly negative.

This is the most conclusive case with which I am acquainted as being in favor of Colles's law. If Colles's law does not explain this, I do not know what other explanation to offer. It is certainly a unique case in syphilitic literature, and is the one which I always invoke when practitioners talk to me about the impossibility of Colles's law. Whenever I see a paper entitled "away with Colles's law!" I think of this colored woman with her immense progeny and this case of superfecundation.

HOW CLOSELY DO THE WASSERMANN REACTION AND THE PLACENTAL HISTOLOGY AGREE IN THE DIAGNOSIS OF SYPHILIS?

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The unimpeachable diagnosis of syphilis is made upon the demonstration of the Spirocheta pallida. After this fact became established, the hope was entertained that the organism might be found regularly in syphilitic placentæ, but competent investigators declare that, although prolonged search (Trinchesi[1]) is more frequently successful, the spirocheta is readily demonstrable in approximately one-third of syphilitic placentæ (Mohn,[2] Bab,[3] Graefenberg[4]). Generally, therefore, the diagnosis rests upon the less specific evidence of the histological changes in the chorionic villi or the Wassermann reaction in the mother's blood. As neither of these tests affords absolute proof regarding the presence of syphilis, we should know how frequently they point to the same conclusion; and, if not always, is one test more reliable than the other?

Besides variations in the Wassermann reaction due to the technic employed[5] and to the interpretation of the degree of fixation observed, the specificity of the test is impaired, since occasionally a positive reaction occurs in diseases other than syphilis. Thus, fixation has been observed in cases of malaria, of malignant growth, of hepatic disease, and of some tropical infections, as sleeping sickness. On the other hand, in an appreciable number of syphilitics a negative reaction occurs, even during the secondary period of the

disease. If interpreted in the light of the clinical history the reaction is rarely misleading, but this means, of course, that as yet implicit reliance upon the test is not justified. With newborn infants, Bar and Daunay[6] report notable inconsistency in the Wassermann; they frequently obtained a negative reaction when syphilis was known to exist.

It is also true that, one after another, the placental phenomena regarded as characteristic of syphilis have been questioned. Upon the gross appearance of the organ it is unsafe to base a diagnosis, for macroscopic signs of the disease are not constant; they were absent in 82 of 160 syphilitic placentæ which Mracek[7] examined. And, conversely, when the fetus dies sometime before it is born, whether syphilis is the cause or not, the placenta may be firmer than usual, its color may be a pale gray, and the maternal surface may have a greasy appearance.

Large placentæ do not necessarily denote syphilis, as was once supposed. Labourdette[8] found that the relationship between the weight of the placenta and the weight of the fetus may not be used to establish a diagnosis. In cases where syphilis was excluded, not infrequently this ratio was 1 : 5, 1 : 4, and occasionally 1 : 3. When the infant is premature this ratio is more significant, but prior to term we must remember the placenta normally weighs more than a sixth of the weight of the fetus.

In the umbilical cord, as in the placenta, Emmons[9] had great difficulty in demonstrating spirochetæ, and no syphilitic cord lesion is regularly found. An exudative inflammation about the vessels which Bondi[10] declared pathognomonic for syphilis may also be caused by bacterial infection.[11] In typical cases when due to syphilis the infiltration is at the fetal end of the cord; when due to placental bacteremia at the maternal end. However, exceptions are frequent and greatly impair the diagnostic value of this lesion.

The most trustworthy evidences of placental syphilis

to which Fraenkel[12] directed attention in 1873 are the histological changes in the chorionic villi. When freshly teased in dilute hydrochloric acid, originally recommended by Eckhardt,[13] or in water and examined under the microscope, the syphilitic villi appear abnormally large, opaque, and irregular in shape with swollen ends. Characteristically the branching is limited, and the bloodvessels are indistinct. While these findings are suspicious, before the diagnosis of syphilis is made, stained sections should be examined. These provide a more satisfactory opportunity for studying the lesion.

The pathological process begins as a proliferative inflammation in the walls of the smallest bloodvessels—that of the terminal villi. Frequently, the lumen of the vessel is obliterated. The enlargement of the villi is the result of the proliferation of the stroma. At last the syncytium which covers the villi proliferates and invades the underlying tissue.

While the changes in the villi constitute the most distinctive evidence of placental syphilis, they have not been accepted by everyone as pathognomonic. In 1903 Hitschmann and Volk[14] observed a similar microscopic picture in cases where a history of syphilis was unobtainable. "All the histological evidence thus far counted characteristic of placental syphilis," they dramatically conclude, "may be found in other conditions and even in normal cases. Perhaps these are cases of occult syphilis, who will bring the proof?" Since this question was asked, the serological method of establishing the diagnosis has been devised; and we have accepted the opportunity to control the microscopic examination of the placenta with the Wassermann reaction in the mother's blood.

Two series of observations have been made, namely, the first upon 260 consecutive cases[15] in San Francisco, where the Wassermann reaction was made by Dr. L. S. Schmidt,*

* Both Doctor Schmitt and Doctor O'Shansky used two antigens; namely, (1) acetone insoluble alcoholic extract of ox heart, and (2) cholesterinized, alcoholic extract of ox heart.

and the second upon 100 consecutive cases in New Haven, where Dr. A. L. O'Shansky made the serological tests. These observations may be classified as follows:

Group.	Wassermann.	Placenta.	Number of cases.			
I	Negative	Negative	242	(San Francisco)	93	(New Haven)
II	Positive	Positive	7	"	3	"
III	Negative	Positive	1	"	0	"
IV	Positive	Negative	20	"	4	"

In groups I and II, which include 345 cases (95 per cent.), the Wassermann reaction and the placental histology agree absolutely and indicate the presence of syphilis in 10 cases, its absence in 235 cases.

The single case in group III, in spite of the negative Wassermann, must be regarded as syphilitic. This woman, aged twenty-seven years, had four consecutive miscarriages. The pregnancy we observed ended spontaneously at the eighth lunar month. The fetus, 40 cm. long, weighed 1960 grams. The placenta weighed 480 grams ($\frac{1}{4}$ the weight of the fetus) and the chorionic villi were definitely syphilitic. At autopsy upon the fetus, the lesions of congenital syphilis were demonstrable. Therefore, the weight of evidence points to the presence of syphilis, and we conclude that occasionally when the Wassermann reaction is negative, the placental findings are more reliable.

Other investigators have found a negative Wassermann reaction in cases of syphilis. In the secondary period of the disease the test was positive in 87 per cent. of Bruch's[16] cases, 92 per cent. of Levaditi's, 96 per cent. of Blumenthal's, 98 per cent. of Blaschko's, and 100 per cent. of Schmenfeld's. Later in the disease Kirschman[17] obtained a positive reaction in only 68 of 100 syphilitic patients. When the infant was syphilitic, Knopfelmacher and Lehndorff[17] failed to obtain a positive Wassermann in the mother's blood in 9 per cent. of their cases. But, if experience counts, these observations made several years ago are less accurate that serologists now obtain. At present many authorities hold that active

syphilis is always accompanied by a positive Wassermann, though with latent syphilis they concede the frequency of a negative reaction as approximately 20 per cent. (Kolmer[18]).

Group IV, comprising 14 cases (10 in San Francisco and 4 in New Haven), is not so discordant as would at first appear, for strong fixation (+ + +) occurred in only two instances. One of these patients was suffering from a streptococcus infection and probably this was responsible for the positive reaction. At least the Wassermann test alone raised the question of syphilis. There was no history of a specific infection, and the chorionic villi were normal. On the other hand, the fetal surface of the placenta was the seat of an inflammatory infiltration; streptococci were found in the subamniotic connective tissues and also in microscopic sections of the cord. On the third day of the puerperium the organism was isolated from the uterine cavity. The infant died of hemophilia; at autopsy none of the lesions of congenital syphilis were demonstrable. Therefore, the positive Wassermann would not seem attributable to syphilis.

The second case of this group with a strongly positive Wassermann reaction, but negative placental findings, was syphilitic. On September 5, and again at the time of delivery, November 18, 1914, the serological test was positive. Furthermore, the mother gave a history of specific infection eight months previously and had not been treated. On account of the maceration of the fetus the autopsy findings were not helpful.

The teased chorionic villi were suspicious of syphilis, though the stained sections were negative. However, other areas of the placenta might have presented the characteristic evidence of syphilis, for it is a well-known fact that normal areas occur in syphilitic placentæ. Clearly, in this case the weight of evidence favors the diagnosis of syphilis and indicates that occasionally the Wassermann reaction is more trustworthy than the placental histology—a situation

which will exist most frequently in cases of postconceptional syphilis.

The other cases of Group IV presented a faintly positive Wassermann. The serologist reported 8 results as a single + (25 per cent. fixation) and 4 results as a double + (50 per cent. fixation). It is significant that 10 of the 12 patients were suffering from eclampsia or a toxemia of pregnancy with albuminuria.

In the early history of the Wassermann test, the occurrence of a suggestive or a positive reaction in cases of eclampsia was noted by Bunzel,[19] Daunay[20] and others. Semon[21] obtained 3 positive, 9 negative, and 1 doubtful reaction in eclamptics without syphilis. We are unable to substantiate his statement that the reaction is negative when the autointoxication is mild. On the contrary the severity of the intoxication bears no relation to the degree of fixation. A double + was twice reported when the albuminuria was of a mild type, while in several eclamptics with severe albuminuria we obtained a single +.

Without doubt in these cases the fixation was due to the metabolic disturbance. Bunzel found that the Wassermann became negative as the toxemic symptoms disappeared. We have not been able to make repeated observations upon our patients, but their histories excluded syphilis and the placentæ were normal. The infants were healthy at birth, and when visited four weeks later none of them had developed stigmata of congenital syphilis.

The frequency with which the Wassermann reaction is positive in toxemias of pregnancy and the question of its associations with a definite form of toxemia are pertinent problems. The limited data at hand will not permit an uncompromising view, but in our experience every third or fourth case of threatened and active eclampsia presents some degree of fixation, generally between 25 and 50 per cent. Whether syphilis underlies the toxemia is a question which can scarcely be raised, since Bunzel demonstrated that the

serological reaction becomes negative as the auto-intoxication of pregnancy disappears.

Having found in the course of chemical analysis of the blood that its cholesterol content varies during pregnancy and that the amount of this substance, while normal in some cases of toxemia is greatly increased in others, we suspected that the latter group might be the one in which the faintly positive Wassermann reaction occurred. But this is not true. A negative Wassermann was reported for patients when the cholesterol amounted to 245 and 180 mgs. per 100 c.c., whereas 25 per cent. fixation was noted when the cholesterol was 144 mgs.

In cases where none of the classical symptoms of toxemia are present and the pregnancy apparently is normal occasionally the Wassermann in the mother's blood is faintly positive. We encountered only two such cases but Pedrini[22] observed them more frequently and in consequence records a positive Wassermann in 10.7 per cent. of the pregnant women he examined. Generally, the reaction is faint; without clinical evidence of syphilis it would never be interpreted as specific. For the present the meaning of fixation in these circumstances is unknown, but probably it is explained by the presence of some substances in the blood referable to the metabolism of pregnancy. At all events the occurrence of the phenomenon in normal cases as well as toxemias emphasizes the value of controlling the diagnosis of syphilis with the microscopic study of the chorionic villi.

To recapitulate, the comparative study of the Wassermann reaction and the placental findings in 360 consecutive confinements indicates that the tests agree absolutely in 95 per cent. of obstetrical patients.

The chief source of confusion lies in the presence of a toxemia of pregnancy which may be responsible for a faintly positive reaction. In these circumstances the fixation should not be taken to indicate syphilis, and accepting that inter-

pretation the serological test and the placenta agree ninety-nine times out of a hundred.

Frankly contradictory results were encountered in three instances. One patient who gave a positive Wassermann was not syphilitic. The other two patients were syphilitic; the first of these presented a negative Wassermann but positive placenta, the second a positive Wassermann but negative placenta. Therefore, it is impossible to say that one test is more reliable than the other, except in cases of postconceptional syphilis, then the Wassermann reaction is more trustworthy. On the other hand, in latent syphilis, the placental histology alone may confirm what is learned from the maternal history or the examination of the fetus.

At present the advisable procedure for the recognition of syphilis in parturient women begins with the study of the freshly teased chorionic villi—an examination which should be made routinely in obstetrical practice. If their appearance points toward the presence of syphilis, hardened and stained sections of the placenta must be studied and the Wassermann reaction in the mother's blood must be determined. Furthermore, all these observations should be made whenever the fetus is premature, macerated, or stillborn.

Instances in which the Wassermann reaction and the placental histology yield contradictory results are rare; and when judged in the light of subsequent serological tests upon the mother, of facts in her history, and of the results of clinical or pathological examination of the fetus, such cases may be properly classified.

References

1. Trinchesi. Bakteriologische und histologische Untersuchungen bei kongenitaler Lues, München. med. Wchnschr., 1910, lvii, 570–574.

2. Mohn. Die Veränderungen an Placenta, Nabelschnur, und Eihauten bei Syphilis und ihre Bezuhungen zur Spirochaete pallida, Ztschr. f. Geburtsh u. Gynäk., 1907, lix, 263–312.

3. Bab. Bakteriologie und Biologie der kongenitalen Syphilis, Ztschr. f. Geburtsh u. Gynäk., 1907, lx, 161–211.

4. Graefenberg. Der Einfluss der Syphilis auf die Nachkommenschaft, Arch. f. Gynäk., 1909, lxxxvii, 190–219.

5. Swift. Serum Diagnosis of Syphilis, Jour. Am. Med. Assn., 1916, lxvi, 599–600.

6. Bar and Daunay. Recherches sur le sero-diagnostic de la Syphilis chez la femme enceinte et l'enfant nouveau-ne (Methode de Wassermann), Obstetrique, 1909, n. s., ii, 192–260.

7. Mracek. Die Syphilis der Mütter und der Neugeborenen, Wien. klin. Wchnschr., 1903, xvi, 519–528.

8. Labourdette. Gros Placentas et Syphilis, Paris Thesis, 1915.

9. Emmons. The Diagnostic Value of the Search for Spirocheta Pallida in the Umbilical Cord of the Newborn, Boston Med. and Surg. Jour., 1910, clxii, 640–641.

10. Bondi. Die Syphilitischen Veranderungen der Nabelschnur, Archiv f. Gyn., 1903, lxix, 223–246.

11. Slemons. Placental Bacteremia, Jour. Am. Med. Assn., 1915, lxv, 1265–8.

12. Fraenkel. Ueber Placentarsyphilis, Archiv f. Gyn., 1873, v, 1–54.

13. Eckhardt. Quoted by Rosinski, Die Syphilis in der Schwangerschaft, Stuttgart, 1903.

14. Hitschmann and Volk. Zur Frage der Plazentarsyphilis, Wien. klin. Wchnschr., 1903, xvi, 822–827.

15. Slemons. The Results of Routine Study of the Placenta, Am. Jour. Obst. and Dis. Children, 1916, lxxiv, 204–215.

16. Bruch, Levaditi, Blumenthal, Blaschko, Schmenfeld, Kirschmann, quoted by Labourdette (8).

17. Knopfelmacher und Lehndorff. Das Collesche Gesetz und d. neuen Syphilisforschungen, Jahrb. f. Kinderheilk., 1910, lxxi, 156–179.

18. Kolmer. Syphilis and Life Insurance, Jour. Am. Med. Assn., 1916, lxvi, 1435.

19. Bunzel. Untersuchungen auf Komplementinde Substanzen im Blute von Schwangeren und Wochnerinnen, Zentralbl. f. Gynäk., 1909, xxx, 975.

20. Daunay. Quoted by Davis, Syphilis in its Relation to Obstetrics, Tr. Am. Gyn. Soc., 1916.

21. Semon. Eklampsie und Wassermann Reaktion, Zentralbl. Gynäk., 1911, xxxv, 556.

22. Pedrini. Una casistica di sieroreazioni di Wassermann nel campo ostetrico, Ann. di Obstet., 1910, ii, 365–373.

SYPHILIS OF THE BODY OF THE UTERUS

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Frequency. The antiquity and frequency of syphilis is well known. It has been estimated that from 10 to 15 per cent. of the urban population of certain European cities is syphilitic, and in some of the hospitals in this country the percentage has been found even higher than this. The disease is from two to four times more frequent in men than in women, probably from 1 to 4 per cent. in women would be a conservative estimate.

It is only since the discovery of the Spirocheta pallida in 1905 and the development of the Wassermann test two years later that the true frequency of this form of infection has become recognized.

In spite of the prevalence of syphilis it is remarkable how seldom the disease has been observed in the body of the uterus. In a review of the literature one cannot but be impressed by the paucity of references and our incomplete knowledge of this subject. A review of the *Index of the Surgeon-General's Library* to 1914 showed but 36 references by 31 authors, and reference to the *Indes Medicus* from 1909 to date disclosed only eight contributions to this subject. The majority of the modern gynecologic text-books have either no reference to syphilis of the body of the uterus, or at most the subject is dismissed in a few sentences. A pleasing exception is noted in the recent work of Krankl

(*Liepmann's Kurzgefasstes Handbuch der gesamten Fraueheilkunde*, Leipzig, 1914, XI, 106) in which a chapter is devoted to this subject. This contains an excellent review of the literature.

Our reviews showed rather frequent reference to syphilitic manifestations localized in the cervix, such as chancre, mucus patch, gumma and a condition which the obstetricians term "ridged cervix" which is prone to produce dystocia. Lesions of the cervix, however, do not fall within the scope of this paper, so that we shall omit them and consider only syphilis of the uterine body.

Pathology. Various classifications for the syphilitic lesions of the body of the uterus have from time to time been suggested. The amount of material from which to draw conclusions is as yet rather small. Many cases have been reported as syphilis of the uterus which are at least of doubtful authenticity. This is especially so of the period prior to 1905.

It is at least theoretically possible that the endometrium may be the seat of a primary sore. This is, however, unproven. The fact that the Spirocheta pallida may become attached to or even possibly enter a spermatozoa is well recognized. In recent years the frequency with which cases of syphilitic infection in women without evidences of a primary sore being demonstrable have been recorded make this possibly at least worthy of consideration. On the other hand, it is well proven that the Spirocheta pallida exhibits a strong predetection for squamous epithelium in the primary infection. This may, however, be the result of misplaced reasoning as the areas naturally most exposed to chancre are covered with this type of tissue. Two other explanations offer themselves for those cases in which no primary sore has been demonstrated. The one that the disease has been hereditary, and the other that the chancre has been present in the vagina or cervix and has been over-

looked. Owing to the fact that chancres produce mild symptoms and are consequently not looked for offers a probable explanation in many cases. It must be remembered that in women a chancre does not leave behind it such definite evidence of its previous existence as it does in men and that the period of its existence is more transitory than in the male. The possibility of the primary sore occurring within the body of the uterus should, however, be considered.

In 1911 Hoffman (*Zeitschr. f. Geburts. u. Gynäk.*, 1911, lxix, 482) presented before the Society of Obstetricians and Gynecologists in Berlin an interesting specimen of gummatous endometritis. The patient from whom the specimen was obtained died of chronic sepsis a few weeks subsequently to delivery. Gummata and other evidences of syphilis were demonstrated in organs other than the genital tract at postmortem. The endometrium in this case contained numerous small gummatous-like tumors, the tissue lying between them was infiltrated with small round cells and presented evidences of a subacute or chronic inflammatory reaction. For the most part the normal constituents of the endometrium were unrecognizable, being replaced by the gummatous tissue. This in some areas was 2 or more centimeters in thickness. The entire endometrial cavity was more or less involved. The uterine body was enlarged and softened.

A more common form of syphilitic endometritis manifest itself by changes in the glands and stroma, the latter being chiefly involved. It is characterized by changes in the bloodvessel walls and condensation of the stroma.

Exactly how frequently this condition exists is not known. Chase's (*Texas St. Jour. Med.*, Fort Worth, Texas, 1913, ix, No. 3, 95–98) recent conclusions regarding the frequency of syphilitic endometritis in general require further confirmation. Recasen (*Ann. de la Acad. de obst. (etc), Madrid*, 1911, iv. 105–112) has described a form of syphilitic endo-

metritis in which the mucosa is thickened and hyperplastic. Ulceration of the endometrium is not infrequent and resulting scars may also be observed. This is particularly likely to result from tertiary lesions. Such lesions have been described by Franceschini (*Gazz. d. osp.*, Milano, 1909, xxx, 537–540).

The histologic picture in specimens of syphilitic endometritis probably varies not only with the stage of the disease but with the period of the menstrual cycle in which the tissue is examined. The underlying musculature is usually more or less involved. Whether or not mucus patches or other secondary manifestations occur in the corporal endometrium is unknown. Many authors believe that such lesions are not uncommon (Franceschini loc. cit.), Chiarleoni (*Trans. Amer. Gyn. Soc.*, XLIst., Annual Meeting, May, 1916). Rille (quoted by G. and E., ibid.), Fasola (ibid.), Spinelli (ibid.), La Torre (ibid.), Morisani (T : Arch. di ostet. e. ginec., Napoli, 1901, viii, 27–46), and that they in some instances produce leucorrhea, dysmenorrhea, and uterine neuralgia.

Lesions of the myometrium may be divided into (1) a more or less diffuse metritis which is usually accompanied by an inflammation of the endometrium, and (2) gummata; in the former condition the uterus retains its normal shape, it may or may not be enlarged, and is usually harder and firmer than normal. In at least one reported case the uterus was atrophic. The uterine walls are lacking in their normal elasticity and in some instances have been almost cartilaginous in consistency. An edema of the uterus and peri uterine tissues has been observed by some authors. The bloodvessels as a rule present the chief changes. These are not peculiar to the uterus but are those common to syphilis of the more frequently attacked areas of the body. Morisani (loc. cit.) as a result of histologic studies of syphilitic uteri considers angiosclerosis of frequent occurrence.

Findley (*Diseases of Women*, Philadelphia, 1913, p. 32) in his excellent text-book considers this subject in detail and apparently concurs in his opinion. A fibrosis of the uterine musculature accompanies the bloodvessel changes.

Gumma of the uterus may be single or multiple and vary considerably in size, but are usually moderate in dimensions, and differ in no respects from similar lesions occurring elsewhere in the body. A student of the literature pertaining to the pathology of syphilis of the uterus cannot fail to be impressed with the paucity of well authenticated cases and with the fact that as yet our knowledge of this subject is far from complete. From a clinical standpoint the question of so-called syphilitic uterine hemorrhages is of perhaps the greatest interest. The common practice of attributing symptoms which clear up under antisyphilitic treatment in patients exhibiting a positive Wassermann test to a syphilitic origin is at least open to scientific doubt. Probably the bleeding in many of these cases is properly attributed to syphilis, but on the other hand with a disease as frequent as syphilis, and taking into consideration the numerous and often obscure non-syphilitic conditions which cause hemorrhage, it is but reasonable to assume that combination of these may occur and the hemorrhage due to a condition totally apart from specific origin.

The writer believes that this is a fertile field for further investigation. With the increasing facilities with which the Spirocheta pallida may be demonstrated and the fact that curettage is a frequent and in many cases justifiable method of treatment of uterine hemorrhages of obscure origin, it would seem not a difficult procedure to work up a series of cases from which a definite base of histologic study could be made. If for example a series of specimens in which the Spirocheta pallida were demonstrated was obtained and these were then studied from a histologic basis, the results of the latter would be to establish upon a

firmer basis the pathology of syphilis of these structures and we would then be in a position to state positively whether or not certain histologic changes were sufficiently characteristic to warrant a diagnosis of syphilis or whether we should have to depend upon the demonstrations of the specific organism, a point which as yet is not satisfactorily determined. With the possible exception of gumma it is with our present knowledge at least doubtful whether a histologic verification is sufficient.

The German views pertinent to this subject are well expressed by Meyer (*Deutsch. med. Wchnschr.*, 1913, xxxix, No. 4, 169–171).

He states that we know very little about the syphilitic inflammation of the uterus, but that Doderlein (*Veit's Handbuch der Gynäk.*, Weisbaden, 1907). Weber and others are of the opinion that there is no characteristic change in the uterine mucosa which can with certainty be described as syphilitic.

Symptoms. These naturally vary with the character of the lesion. With the present unsatisfactory status of the pathologic changes produced, the symptomatology is necessarily uncertain. Undoubtedly hemorrhage is the symptom which has attracted the most attention. We have already mentioned the fact that hemorrhage is frequently attributed to a syphilitic origin without convincing proof. Hemorrhage is by no means a constant symptom in endometritis or metritis in general although variations of menstruation are of frequent occurrence. In such conditions the ovaries are usually more or less involved in the inflammatory process and whether or not the menstrual irregulation occurring in these cases are the result of the uterine or the ovarian involvement is open to doubt. This naturally opens the entire and much debated question of the cause of such hemorrhage. Time will not permit a discussion of this subject. It is suffice to say that the author is of the opinion that

inflammation of either the ovary or the uterus may under certain circumstances result in menstrual irregularities, but that in the majority of cases the ovary is the governing factor.

The most frequent form of hemorrhage described is metrorrhagia. In 1906 Dreyer (*Dermat. Ztschr.*, Berlin, 1906, xiii, 537–546) collected from the literature fourteen cases of hemorrhage attributed to uterine syphilis. A year later Muratow (*Zentralb. f. Gynäk.*, Leipzig, 1907, xxxi, No. 27, 830–838) called attention to the fact that syphilitic hemorrhage from the uterus is not so rare as one might think and as evidence of this he mentions the cases of hemorrhage which do not respond to the ordinary styptics and curettage, but do well under specific treatment. He points out that in such cases the uterus may be neither enlarged nor painful, but is firm in consistency and the cervix often hyperemic. Hemorrhages in young girls Maratow (loc. cit.) believes are frequently due to a latent form of hereditary syphilis. In 1909 Falk (*Trans. Berlin Obstetrical Society*, 1909) demonstrated before the Berlin Obstetrical Society a case of luetic ulcer of the portio associated with syphilitic metrorrhagia, which disappeared under specific treatment. Recasens (*Ann. de la Acad. de Obst.* (etc.) Madrid, 1911, iv, 105–112) reported 6 cases of syphilitic metritis, 5 of which were cured by treatment, but in the 6th case carcinoma of the fundus was suspected and a hysterectomy was performed, but upon microscopic examination no cancer was found.

Meirowsky and Frankenstein (*Deutsch. med. Wchnschr.*, Berlin, 1910, xxxvi, No. 31, 1444–1445) have described 3 cases of tertiary syphilis in which amenorrhœa persisted for six years in 2 cases and for eight years in the 3d. In two of these the menses returned after the exhibition of specific treatment and the third menstruated vicariously through the nose after treatment was instituted. These authors attribute the amenorrhœa to either constitutional

causes such as often produce amenorrhœa in subjects of pulmonary tuberculosis or to a syphilitic oöpheritis.

McIlroy, Watson and McIlroy (*Brit. Med. Jour.*, London, 1912, 1002) applied the Wassermann test to 100 gynecological patients in only 6 of whom was there a clinical history of syphilis.

The test was positive, however, in 43 cases, negative in 48, while in the remaining 9 cases it was doubtful. They state that their results show that cases in which uterine hemorrhage apart from tumor is the principal feature, syphilis very frequently is present. They are also in accord with Muratow (cited above) in the belief that some of the cases of menarcheal hemorrhage are of syphilitic origin. Further work along this line has been done by Whitehouse (*Jour. Obst. and Gyn. of the Brit. Emp.*, London, 1914, 13–25). He studied 16 patients with a clinical diagnosis of chronic metritis and subjected them to a Wassermann test. Only 1 patient furnished a history of lues. All of the others strongly denied such a possibility and there was no reason to doubt them. In spite of this, however, 7 cases gave a well-marked positive reaction. These patients all applied for treatment on account of pelvic pain, irregular and profuse uterine hemorrhage, and watery or mucopurulent discharge.

The physical signs obtained upon bimanual examination were those usually regarded as characteristic of chronic metritis; namely, a slight but uniformly enlarged uterus, firm in consistence, and tender upon palpation. The specimens removed from these cases show well-marked fibrosis and peri- and endarteritis. Whitehouse believes that true gumma does not occur in the corpus uteri. He also calls attention to the fact that although pyometra is usually attributed to malignant disease, he has observed two cases and records two others from the practice of another physician in which pyometra occurred in patients with well-

marked tertiary lesions and no evidence microscopically or macroscopically of malignant disease. He has never been able to demonstrate the Spirocheta pallida, either in sections of the uterus or in the menstrual blood but is impressed with the necessity of testing by the Wassermann reaction all patients who present the clinical picture of chronic metritis or fibrosis.

As in all inflammation involving the endometrium and myometrium leucorrhea is a not infrequent symptom. Various types of leucorrhea have been described. Neuman (*Syphilis*, Vienna, A. Hölder, 1896.) believes that the discharge is usually thin and moderately profuse. Pain, dyspareunia, and other symptoms common to non-syphilitic metritis have been noted. As a matter of fact none of the local subjective symptoms are by any means characteristic of syphilis. The following is the report of a case of probable syphilis of the uterus.

Aged thirty-six years, white, married, three children; three miscarriages. Family history, negative. Chief symptom, menorrhagia.

Previous History. Until the past five years has been a strong healthy woman. Married at twenty-four years, twelve years ago. Three children, ages respectively, ten, eight, and seven years. All three children are healthy and strong. Six years ago the husband contracted syphilis, and upon the development of the secondaries was placed upon treatment by his family physician. At about this time he undoubtedly infected his wife. She, however, gives no history of a primary sore, but the development of typical secondaries and their disappearance under treatment established the diagnosis. During the past six years or since the onset of her syphilis the patient has had three miscarriages, advanced respectively; 2, 3, and 5 months, the last of these six months ago. The patient has been treated by her family physician for syphilis until nine months

ago (mixed treatment), when treatment was discontinued by the patient as she believed herself cured. Until coming to the University Hospital no Wassermann tests or attempt to demonstrate Spirocheta pallida had been made.

Present Illness. A five months' miscarriage occurred six months ago; one month later menorrhagia developed. Instead of the periods as formerly lasting four to five days, they now last eight, ten, or twelve days. The bleeding is for the first six to twelve hours moderate in amount, but by the second day is profuse, bright red, and takes on the character of a severe hemorrhage. This continues for a varying period of time and gradually diminishes, a moderate mild flow continuing and lasting for a week or more. As a result of the last three bleedings, despite the usual treatment, such as rest in bed, ice, ergot, etc., so much blood was lost that the patient has been much weakened. When brought to the hospital the patient had been bleeding for twelve days. For the last three periods patient has been bedridden during and for some time following the flow. Between periods and especially during the days immediately following the cessation of the bleeding there has been a profuse, thin, non-odorous leucorrhea. This has apparently not been especially irritating. Dizziness, weakness, headaches, and other evidences of anæmia have been present. All these symptoms are worse toward the end of and immediately following the flow. There has been no pain at any time. The appetite is variable and the bowels at times constipated.

Physician's examination: This reveals a moderately well-nourished woman. The heart, lungs, liver, and kidneys are normal.

Blood: hemoglobin 52; red blood-corpuscles, 5,000,000; white blood-corpuscles, 4500.

Wassermann test: strongly positive.

Abdominal examination: negative.

Pelvic examination: negative outlet multiparous. Good support in anterior and posterior wall, cervix normal in size and shows a well healed bilateral laceration. It is softer than normal and the canal is patulous, slightly dilated, just admitting the tip of the finger. The uterus is normal in size, shape, and position. It is movable and not unduly tender even on deep palpation. The adnexæ are normal. A careful examination fails to reveal any evidence of the site of the primary sore.

Owing to the lack of any assignable cause for the hemorrhage, a diagnostic curettage was decided upon.

Operation. On moderate traction with a tenaculum during an effort to draw down the cervix the instrument tore through the cervical tissue. During the curettage with a Martin curette the fundus was perforated. No undue force had been used. In view of the evident softness of the uterus, the fact that a perforation was present in the fundus, the history of severe and persistant bleeding, the age of the patient, and the fact that she already had three living children, a hysterectomy was decided upon and performed in the usual manner. The tubes and ovaries were not removed.

Convalescence: was normal. The patient was placed upon a tonic and one administration of salvarsan was given intravenously before leaving the hospital and her family doctor advised as to the condition so that antisyphilitic treatment could be continued. The specimen consists of curettage and uterus.

Curettings: These consist of a moderate amount of macroscopically normal endometrium.

Uterus: This has been removed by supravaginal amputation. It is normal in size and shape, measuring 7.5 cm. from the point of amputation to the top of the fundus, 6 cm. laterally, and 5 cm. anteroposterily (through fundus). The endometrial cavity presents no abnormalities; an

incomplete curettage has been performed. It measures 5.5 cm. in depth. The myometrium is normal in thickness, and is rather paler than normal, cuts with ease, and in the vascular layer large numbers of bloodvessels are present, the cut ends of which are remarkably prominent. These and the friability of the tissue are the chief peculiarities of the specimen. The myometrium is so soft that the walls may be squeezed through with ease at any point with the thumb and forefinger. In the posterior wall of the fundus is a perforation which will admit a small lead pencil.

Histological Description. Endometrium: The endometrium is normal in depth or perhaps slightly thickened. The surface is fairly smooth and is covered with a single layer of high columnar cells. The superficial layers of the stroma are infiltrated with blood, serum, and chronic inflammatory products. At some points subepithelial hemorrhages are present. In one of these the surface epithelium has been desquamated. The deeper portions of the stroma are condensed and fibrous. Many bloodvessels are observed. The majority of these possess well-developed muscular walls in which marked sclerosis is present. Scattered here and there are areas of chronic inflammatory reaction. The line of demarcation between the mucosa and underlying muscularis is well defined. The glands are normal in number, size, and shape, and are of the interval type. The specimen thus resembles an endometrium the seat of a chronic diffuse inflammation with marked angiosclerosis.

Myometrium: Four sections taken from various portions of the uterus. All present the same general histologic character. Immediately beneath the endometrium there is an ill-defined zone of chronic inflammatory reaction which gradually fades into the deeper and uninflamed myometrium. The bloodvessels are more numerous than normal and possess unusually thick walls. This is most marked in the media. The arteries and veins are both affected.

but the changes are more pronounced in the former. In some instances the bloodvessels are six or seven times the normal size and in some the degenerative changes involve not only the vessel walls but also the adjacent myometrium, peri-arthritis. In one or two areas thrombi are present, while in a few fields vessels are observed in which, as a result of endarteritis, complete obliteration of the lumen has occurred. In many areas extravasations of free blood are present. The lymphatic spaces are dilated. The fibrous and muscular tissue stain poorly in the eosin and hæmatoxylin preparations. Much free serum is present as a result. In some areas the muscle-fibers can be seen partially separated. In some fields these edematous areas are more marked than in others but are quite as numerous in the fundus as in the lower portion of the uterine body. The chief histologic characteristics in this specimen are the angiosclerosis affecting chiefly the inner coats of the vessels, and the areas of edema above described. Section fixed in Zenker's and in 4 per cent. formalin solution and stained in hæmatoxylin and eosin, Weigert's fibrin stain and Van Gieson's stain.

Diagnosis: Syphilis of the Uterus.

The histologic picture present in this specimen conforms closely to that described by other authors. Whether or not syphilis produces sufficient characteristic lesions in the uterus to warrant a positive diagnosis has already been considered. In this case the changes are typical of those produced by syphilis elsewhere in the body, and I have little doubt as to the correctness of the diagnosis. The histologic picture is not that of a subinvolution nor does it at all resemble those cases which are usually classified as fibrosis of the uterus. Furthermore the histologic examination is confirmed by the history, and clinical finding. This patient contracted syphilis six years ago, antisyphilitic treatment was discontinued nine months ago. Menorrhagia and other symptoms of syphilis of the body of the uterus developed three

months later. The Wassermann test was at this time strongly positive.

Undoubtedly the chief clinical symptoms was the menorrhagia and the chief pathologic lesion the great softening and friability of the uterus, together with the more typical changes usually produced by syphilis. Marked softening of the uterus has been noted by a number of observers, but is by no means characteristic of this variety of infection. Weber (*Ztschr. f. Geburtsh. u. Gynaek.*, 1908, lxii, 640). Freund (*Tr. Am. Gynec. Soc.*, Washington, 1916), Boldt and others have recorded cases in which softening was a marked feature.

EXPERIMENTAL SYPHILIS

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(By Invitation)

The discovery of the Treponema pallidum by F. Schaudinn[1] brought the study of syphilis within the scope of medical research. Because of the lack of definite data concerning the nature, morphology, and distribution of the causative organism, our conception of this disease, founded almost entirely upon clinical observation, had been very fragmentary until the time of Schaudinn's discovery. It is the purpose of this paper to review the results which the work in this field of research has yielded, and to point out the application of the experimentally elicited knowledge to the accepted facts and to some of the problems which still present themselves.

Inasmuch as numerous organisms had been described as the etiologic factors in this disease, the announcement that the pallida was the causative agent of syphilis met with considerable skepticism. It became necessary, therefore, to establish the causal relationship of the Treponema pallidum to syphilis. This was accomplished by:

1. The observation of the organism in the syphilitic lesions incident to the various stages of the disease.

2. The successful inoculation of lower animals from human lesions, thereby producing syphilis experimentally in rabbits, monkeys, and other animals.

3. The growing of the Treponema pallidum in culture media free from contamination, the transfer of these cultures through many generations, and the successful inoculation of lower animals with the cultivated organisms.

Sufficient evidence has been brought forward in recent years to show that the Treponema pallidum occurs regularly in all stages of syphilis. In the systematic search carried out during the past eight to ten years, the presence of this organism has been demonstrated, in the early syphilitic lesions, which from clinical observation must be considered infectious. Likewise, in the later stages of this disease, the pallida has been found to be the cause of the degenerative changes observed in the cardiovascular system and connective tissue.[2] Noguchi and Moore[3] succeeded in demonstrating the pallida in the brains of general paretics and in the lesions in the spinal cord of tabetics. The noticeable number of syphilitic reinfections described in the literature during the early period of the salvarsan era led to the examination of the scar tissue of healed primary lesions. Microscopic examination disclosed the fact that such scar tissue may contain the pallida. Conclusive evidence was furnished by the experiments of Hoffmann and Sandmann,[4] who by inoculations with the scar tissue of healed primary lesions, succeeded in transmitting the disease to monkeys. These foci of organisms may persist for considerable periods, giving an indication of the length of time the pallida may persist in a state of quiescence.

That the presence of the pallida need not be coincident with manifestly syphilitic lesions was pointed out by Campbell.[5] The occurrence of the pallida on the unaffected surfaces of tonsils in secondary and latent syphilitics may be just previous to or shortly after the appearance of a lesion in the mouth. Once the infection, as manifested by the primary lesion, is well established, the pallida invades the lymphatic system and only subsequently makes its appear-

ance in the blood. Attempts to cultivate the pallida directly from the blood have been unsuccessful. The organism does not seem to grow well in the presence of blood. Inoculation experiments were carried out by us on rabbits, by injecting immediately after it was drawn, 5 c.c. of blood from patients exhibiting a well-marked secondary eruption, into the ear vein of the animal. These experiments proved successful in three out of five attempts. If, however, the blood was allowed to coagulate, the inoculations were negative. It is possible that the pallida are so firmly held by the fibrin in the clot that the grinding of the clot and the subsequent filtration to get rid of the coarser particles, also remove most of the organisms. The lesions appeared in the testes of the successfully inoculated rabbits about four to six weeks after inoculation. In no other organ or gland could the pallida be found, although we examined fresh preparations from them under the dark field. Levaditi and Petresco[6] demonstrated the pallida in the serum of blisters resulting from the application of cantharides plasters. C. H. Hermann[7] made similar observations.

The search for the Treponema pallidum in the cerebrospinal fluid yielded negative results at first; later the organisms were found and described by Rosenberger[8], Sagary, and Paikard.[9] That the urinary sediment in syphilitic nephritis may contain the pallida has been shown by Hirshberg[10] and MacLennan.[11]

Long before the organisms had been observed in microscopic preparations from tertiary lesions, the presence of the pallida in these lesions was demonstrated through animal inoculation. The early negative findings led Schaudinn to the assumption that the pallida might be present in a changed form, representing possibly a resting phase in the life cycle of the organism. Through painstaking and persistent search, Doutrelepont and Grouven[12] and Tomasezewski[13] succeeded in finding typical forms of the pallida in gummas and other

tertiary lesions. Thus, the experimental work was corroborated by their pathological findings. Throughout the entire course of the disease the pallida may be demonstrated in the lesion, characteristic of the successive stages of acquired syphilis.

Congenital syphilis apparently presents no exception. In acquired syphilis the fact has been noted that the pallida may remain alive in the organism over extended periods of time without giving rise to recognizable syphilitic lesions, or even to symptoms which might lead us to suspect their presence. It is fair to assume that congenital syphilis may likewise exhibit similar periods of latency, noted in children of syphilitic parentage, who may not present any of the signs and symptoms of the disease during their first years. That the pallida is the cause of subsequent syphilitic manifestations is shown by the findings of Hoffmann, who demonstrated the pallida in the blood of a congenital syphilitic child; and again by Igersheimer,[14] who found the organisms in the cornea of a congenital syphilitic boy of fourteen.

Congenital syphilis has offered exceptional advantages for the study of the influence which the presence of the Treponema pallidum exerts on the vascular system and adjacent tissues. Almost all organs and tissues may harbor the pallida. It may be found in varying numbers in sections prepared from the liver, spleen, kidneys, suprarenals, muscle and heart muscle; also in the bone marrow and in the epiphyseal zone of the long bones, in the blood and skin, and in inflammatory areas of the meninges. The occurrence of the pallida in the mucous membranes of the stomach and intestine has been pointed out by E. Fraenkel[15] and Simmonds.[16] The last-named author found them also in the brain, spinal cord, ovaries, uterus, testes, prostate, and bladder. The pallida are not found evenly distributed throughout the body, nor in all the organs. Their distribution seems to depend on the severity of the infection,

which may be septicemia. More often the syphilitic lesions are restricted to several regions or organs. Stillborn fetuses show a greater degree of infection than children who succumb to the disease after birth. The liver, stomach, and intestine seem to be the organs first invaded; next in order are the lungs, suprarenal glands, and the skin. The invariable occurrence of these organisms in the liver is due to the fact, as has been pointed out by Levaditi,[17] Gierke,[18] and Beitzke[19] that the pallida are carried from the syphilitic mother through the umbilical vein to this organ. Lymph glands, spleen, and thymus are less frequently affected.

The distribution of the Treponema pallidum corresponds in a general way to the visible pathological changes. The pallida, however, may occur in regions where no changes from the normal are noticeable, and may be entirely absent in regions which have undergone extensive tissue changes. The pallida will then be found in the tissues surrounding such lesions. The slow and protracted toxic action of the pallida, no doubt, accounts for its occurrence in localities exhibiting normal histological conditions before pathologic tissue changes have had time to develop; and may also be the reason for their absence in areas which show pronounced degenerations characteristic of the disease.

The walls of the blood and lymph vessels, the interstitial tissue and capsules of the organs frequently exhibit the organisms in very large numbers. One may also find them free in the lumen of the vessels. The parenchyma of the organs is invaded later, and here they occur mostly intercellular. Gierke[20] and Frohwein[21] have observed them intracellular. It is still an open question whether the appearance of the pallida within polynuclear leukocytes is due to phagocytosis, or whether, as appears to be in case the parenchyma cells of the liver and salivary glands, the organisms migrated into these cells. The nature and extent of the defensive cell reactions of the body against the infection of the Tre-

ponema pallidum is as yet little understood. The occurrence of the organism in relatively small numbers in the spleen and lymph glands has led to the assumption that the pallida are destroyed in these organs. Systematic examinations of placental tissue have disclosed the presence of the pallida, either in the maternal or in the fetal part of the organ, or in both. That the treponema does not occur with any frequency in the placenta has been pointed out by Wallich and Levaditi,[22] who found the Treponema pallidum in only one out of thirteen placentas of syphilitic women. Mohn[23 24] found them in 7 cases out of 15. The placenta will be found to contain the pallida whenever the fetus shows signs of the infection. Therefore, it seems probable that the pallida reaches the placenta from the fetus, which has been infected from the mother during the early period of gestation. Trinchese[25] expresses the view that the embryo is infected through the pallida in the maternal blood and not through the infection of the ovum as has been considered possible by Mohn. Trinchese's view is furthermore supported by the observation of Fieux and Mauriac,[26] who noted the birth of a syphilitic fetus from a case of postconceptional infection.

These observations, as well as the numerous communications which have appeared, leave little doubt that the Treponema pallidum is almost invariably present in all forms of syphilis. Their demonstration is of great diagnostic value in clearing up doubtful cases and in leading to the application of specific therapy. Because it is easier and more definite, the diagnosis by means of the stained preparation or the dark field is in many cases superior to the serodiagnosis of Wassermann.

There were in earlier times a few attempts at inoculation in human beings, but these sporadic efforts could never serve as a basis for systematic experiments. A satisfactory solution of the conditions necessary for infection and immunity could be obtained only through animal experiments. The transmis-

sion of syphilis to apes, monkeys, and rabbits by inoculation must for this reason be considered a decided step in advance. Metchinkoff and Roux[27] were the first to succeed in the inoculation of apes. The possibility of transmitting the disease to rabbits was first demonstrated by Bertarelli,[28] [29] who also successfully inoculated dogs and guinea-pigs. Uhlenhuth and Mulzer,[30] [38] Truffi,[39] Neisser[40] [41] took up this work for biological, immunological, and therapeutic studies. Noguchi[42] and myself[43] used the testicular lesions of rabbits for cultivation experiments.

To inoculate the lower animals successfully it is necessary that the material employed should contain the pallida in a viable form. It should be fresh and sufficient in quantity. It is best to have the animals at hand and to carry out the operation as soon as the material is obtained. The material should not be divided into very small pieces for the sake of inoculating a large number of animals. The chances of success are better if fewer animals are used and the inoculation dose increased.

Apes and monkeys are inoculated by the cutaneous method. The skin is scarified fairly deep and the syphilitic tissue is rubbed thoroughly into the scarified area. The uninjured skin does not permit the passage of the pallida, for all attempts at inoculation without previous scarification have been negative. The inoculation may be made on any part of the body of higher apes, though the forehead is usually the site selected. Monkeys and rabbits may be inoculated into the testis. With rabbits the inoculation into the anterior chamber of the eye is also a common mode of procedure. Such experimentally produced lesions may serve as inoculation material for further transplantations. If the tissue used for inoculation has been free from contamination, the wound produced through scarification will heal completely. After a period of incubation of from fifteen to sixty days the primary lesion will appear in the

form of one or several papules. These papules coalesce and give rise to a typical primary ulcer, surrounded by an indurated area, which may persist from several weeks to a month and then heal. Not every successful inoculation will give rise to secondary lesions. Such secondary eruptions have been observed on apes by Metchnikoff and Roux. Inguinal adenitis frequently follows inoculations into the testis, yet the pallida do not occur in large numbers in these glands. Aside from the presence of the pallida in the lymphatic glands draining the infected area, Neisser has demonstrated the organisms in the spleen and bone marrow of infected animals.

Bertarelli[28] [29] was the first to demonstrate that rabbits could be inoculated with syphilis. Through the injection of finely ground syphilitic tissue into the anterior chamber of the eyes of rabbits, he observed specific changes in the cornea. He likewise demonstrated the organisms in the lesions both under the microscope and through further transplantation from rabbit to rabbit. Attempts by this author to produce syphilitic infection through subdural inoculation gave negative results. Inoculation into the skin gave only occasionally positive results.

The discovery that the testes and the coats of these glands were especially susceptible to the syphilitic virus was of great importance in the field of experimental syphilis. The Treponema may be passed from rabbit to rabbit, thus yielding material very rich in organisms, and in the course of transplantation may become free from all contamination. Depending upon the technic of inoculation the lesions produced by these transplantations vary from a typical chancre to a gumma. If the infected tissue is placed directly under the skin of the scrotum a chancre will develop. If the inoculation material is inserted between the layers of the tunica, thickening of these layers will occur, due to the increase of connective tissue. The inoculation of the gland

itself is followed by inflammatory reaction and swelling which after their subsidence result in mucoid degenerations of parts of the glands. These areas may be detected by palpation. On dissection they appear pearly white, stringy, and gelatinous. Such areas are very rich in the Treponema pallidum. The period of incubation varies from ten days to two months. The lesions will heal spontaneously. Opinions differ as to whether such animals have acquired an immunity. In my own series of transplantations, fourteen rabbits which had developed gummas subsequent to the first inoculation did not contract syphilis from a second inoculation, irrespective of the strain used. Following the third reinoculation one rabbit developed lesions. These negative results may be due to errors in technic, or the animals may have still harbored the pallida from the previous inoculation. There was no apparent lesion, however, which might have suggested this.

During the past three years we have inoculated about eight hundred rabbits with an average take of 25 per cent. The number of successful inoculations depends on the virulence of the organisms, the resistance of the animal, and on the circumstances attending the time of operation. The Treponema pallidum is easily injured. Strains may be kept for long periods by successive transplantations in rabbits. The results of our experiments show that we have carried four strains in this manner for about two years. The pallida do not loose their pathogenicity by passage through rabbits; for a case of accidental inoculation in the finger while performing transplantation is reported, which was followed by a characteristic primary lesion at the site of infection.

In a few cases generalized syphilis in rabbits following inoculation has been observed. Uhlenhuth and Mulzer[37] [38] noted generalized syphilis in rabbits and monkeys following intravenous inoculation. Grouven[44] was able to observe

secondary lesions within two years in monkeys, and within one year after inoculation in rabbits. Sowade[45] observed it in rabbits following intravenous injection of the culture of the pallida. Baermann[46] describes the occurrence of secondary lesions following the subcutaneous inoculation in monkeys. We have never seen a case of generalized syphilis in our series of animal inoculations, not even in those animals injected into the ear vein with large quantities of blood from secondary syphilitics. Of special interest in this connection are the observations of Arzt and Kerl,[47] who describe the occurrence of a spirochete, possibly saprophytic, in non-syphilitic lesions on the genitalia of rabbits. The organisms in question closely resemble the pallida morphologically. The lesions in which they were observed were flat ulcerations. In one instance they were also found in a papule in the mouth. In four cases the organisms could be demonstrated in the regional lymph glands. The infection could be transferred from rabbit to rabbit, though not to monkeys. The authors examined in all eight hundred and fifty animals from various sources, of which seventy-two had the above-mentioned infection. Although the possibility of a generalized syphilitic infection in rabbits following inoculation must be conceded, especially when the injection has been made into the blood stream directly, and with large quantities of material, the instances cited are exceptional.

Experimental syphilis permitted comparative histological and pathological studies of the lesions produced by the pallida in man and the lower animals. It also served as a means for obtaining material very rich in organisms, and this material was the starting point for the attempts to cultivate the organism *in vitro*.

In cultivating the Treponema pallidum the methods employed in this country and abroad differ, in that investigators in this country used the experimentally produced

lesions in rabbits to cultivate the pallida, whereas the European investigators made use of the tissue from human syphilitic lesions directly. The pallida was grown in pure culture first by Noguchi,[48] [49] who used serum water and normal rabbit tissue to grow the organism. The cultures were kept under hydrogen. The workers abroad, Mühlens,[50] [51] Hoffmann,[52] [53] Schereschewsky,[54] Sowade,[55] Tomasezewski[56] [57] and others, made use of partly coagulated horse serum for its cultivation. The claim to have succeeded first in growing the pallida in pure form is made by Mühlens, who in describing his cultures called special attention to the characteristic pungent odor produced by the pallida. That the odor was due to contaminating organisms there is little doubt, for the cultures of Noguchi as well as our own are devoid of any odor. Nor could it have been due to the horse serum employed, for we have cultivated the pallida according to the methods described by Noguchi and those made use of by Mühlens without noticing any odor.

The pallida grows diffusely in solid culture media, giving it a hazy appearance. The growth extends to within one-half inch of the top of the agar column. In liquid media the growth extends in the form of a faint cloud to about the same height. In the older cultures the organisms settle as a fine flocculent precipitate to the bottom. The organisms grown in liquid media exhibit characteristic motility. Those grown in solid media are less motile.

The pallida when carried in culture will soon loose their pathogenicity for rabbits. The injection of large amounts of emulsified ascitic agar cultures has never resulted in a lesion. There are no data available as to the pathogenicity of the pallida in culture toward man.

The greatest difficulty, therefore, in attempting to cultivate the pallida consists in obtaining the first take on inoculation of culture media. Not all strains of this organism lend themselves to cultivation or to inoculation experiments. Even

after the pallida have begun to grow, the process of eliminating the contaminating organisms calls for perseverance and patience. The transfer of the cultures once pure simply calls for the necessary precautions to prevent accidental contamination. The cultures are transferred once a week. The pallida will grow, however, in deep ascitic agar for several months.

Observed under the dark field, the different strains under cultivation when compared with the organisms taken directly from the human lesion vary in thickness and appearance. This variation may be due to the influence of the culture media employed. Very short as well as very long forms may be observed in the same culture. At times, cultures are found in the same strains in which the organisms exhibit fine, filamentous processes at each end. These processes are so fine that it requires ideal conditions to observe them. Wide variations occur also in respect to the number, width, and height of the spirals. Individuals may be observed which are partly straight, exhibiting the spiral form on one pole only. There is also some variation in thickness in the organisms in the same culture. Aside from these peculiarities some strains of the pallida are thin, others thicker. This characteristic of the individual strains is better preserved in liquid than in solid media. Whether the thicker forms possess an affinity for the nervous system as indicated by Nichols,[58] Noguchi,[59] Uhlenhuth and Mulzer,[60] and Wile[61] has not been definitely established.

The pallida multiplies by transverse division, for one can find in culture forms exhibiting a delicate plasma bridge between two individuals. Longitudinal division of the pallida has been described by Herxheimer[62] and Loewy.[63] Nakano,[64] in describing his observations on the division of the pallida, expresses the opinion that the longitudinal divisions observed were simply the free ends of two individuals wound around each other. The technical difficulties involved in success-

fully staining the Treponema pallidum have hampered the study of the cytology of the organism. Noguchi describes the presence of small granules in the protoplasm of the organisms which are set free. Whether these granules are in any way connected with reproduction is still open to question.

It was formerly supposed that syphilis is a disease to which man only is susceptible. The experiments of Metchinkoff and Roux[27] in 1903 were the first positive indication of the possibility of experimental syphilis in apes. Since that time our conceptions regarding the natural immunity of animals have undergone a change. With the ability to transmit syphilis to lower animals and the cultivation of the pallida in pure form, attempts at immunization were undertaken. Nakano,[65] who treated rabbits with killed cultures of pallida, could detect agglutinins in their blood, while precipitins were absent. He also believed that he noted specific complement-fixation. With Pfeiffer's experiment he was able to detect a weak lysin. Active immunization experiments with cultures of the pallida were negative, as were also his attempts to immunize human beings with a vaccine prepared from such cultures. He found that the serum of immunized rabbits possessed neither immunizing nor therapeutic properties. The pallida in the tissue exhibits a high resistance to bactericidal substances. Nakano found living pallida in primary lesions after injecting them with 10 per cent. antiformin solution. Kolmer,[66] who also immunized rabbits with cultures of the pallida, described the presence of complement-binding antibodies and agglutinins. He was unable, however, to demonstrate agglutinins in the serum of syphilitic patients even when they gave a positive Wassermann reaction. Schereschewsky,[67] who likewise carried out immunization experiments, prepared the vaccine by means of antiformine solution and heat. By injecting the vaccine intravenously he was able to immunize two

monkeys. He noted the presence of precipitins as well as complement-binding antibodies in the serum of rabbits treated with the vaccine. He therefore concluded that the immune bodies which he was able to produce and demonstrate were the result of the endotoxins of the pallida, liberated through the antiformine treatment.

Zinsser, Hopkins, and Gardner[68] also immunized rabbits with cultures of the pallida, and were able to note the presence of agglutinins. The sera of rabbits immunized with one strain agglutinated another strain in a dilution of 1 to 500. They also made the observation that normal human serum, as well as sera from syphilitic patients with positive Wassermann reaction, would agglutinate similar pallidum suspensions. The dilutions of the sera of syphilitics and non-syphilitics which caused agglutination of the suspensions of the pallida are not given, so that it is impossible to determine whether the difference between the two types of sera is sufficient to be of diagnostic value. It is evident that immunity against the pallida, as far as it exists, is not absolute. The experiments on record to date are not sufficient to determine this question.

Although the observations of generalized syphilis in the lower animals following inoculation are comparatively rare, the clinical manifestations, as far as they occur, do not differ materially from those observable in man, who must be considered the most susceptible to this disease. Syphilis has never occurred in an endemic form among healthy and inoculated animals when kept together. There is in man no hereditary immunity to syphilis. The observations that certain localities and races are entirely or relatively free from syphilis is due not to immunity to this disease but to social restriction and religious customs.

An individual disposition which may result in a severe or light course of this disease may be assumed. Experimental work has yet afforded us no indication that malignant

syphilis is due to a special type of organism. The occurrence of the severe types of syphilis in cases of tuberculosis and in individuals weakened by other diseases, as well as the observation that individuals infected from those having malignant syphilis exhibit the disease in a milder form, or *vice versa*, indicates that the factors determining the course and severity of the disease are either a weakened condition of the individual or an individual idiosyncrasy toward the Treponema pallidum. The frequency or entire absence of tabes and general paresis may be due to this individual disposition and to the effect of alcohol, which no doubt renders the nervous system of the individual more susceptible to the infecting organisms. This predisposition may also be racial.

By acquired immunity we understand the temporary or permanent ability of an individual to overcome subsequent infection after having recovered from the first attack of the disease. The defensive forces of the body which formed during the first attack make it impossible for subsequent attacks to develop. The dictum of Ricord that no one could be subject to constitutional syphilis twice, that is, that there existed an acquired resistance to a second attack of syphilis, cannot be maintained, inasmuch as reinfections with the Treponema pallidum after complete recovery from the first infection have been recorded. E. Klausner[69] describes such a case, which, on account of the carefully controlled observation, is of interest. The patient who presented himself with the initial lesion (spirocheta positive, Wassermann reaction + + positive), lymphadenitis, and a papulopustular exanthem, was treated with salvarsan and discharged after the symptoms had disappeared and the Wassermann reaction had become negative. One year later this patient exhibited a new initial lesion (spirocheta positive), Wassermann reaction negative, regional and universal lymphadenitis and a universal maculopapular exanthem. With the appear-

ance of the exanthem the Wassermann reaction became again positive. In reviewing the literature on this subject, it becomes evident that not all cases of reinfection described are such, as single secondary lesions have been observed. These pseudoreinfections are due to the liberation of the pallida from syphilitic foci which, not influenced by the therapeutic measures taken, spread as soon as the condition of the patient is favorable for it. In a sense this also is reinfection, but with the same strain of organisms. Krefting[70] cites a number of cases of reinfection, and describes the recurrence of the primary lesion at the site of the old two months later.

Klausner suggests the following criteria to distinguish between a pseudoreinfection and a reinfection in the sense that the disease was cured and the patient contracted syphilis a second time; an unquestionable history of the first infection the diagnosis of a second infection, based on the initial lesion typical changes in the lymph glands and appearance of the secondary symptoms. Of great importance, though not absolutely necessary, is the Wassermann reaction, negative in the beginning and becoming positive as the secondary exanthem manifests itself. John,[71] who reviewed the literature on this subject, collected 356 cases of reinfection, and of this number only 119 could be classed as true reinfections. Hutchinson, J.,[72] describes 7 cases of reinfection which came under his own observation. He points out, in conclusion, that the interval between two attacks of syphilis may be so short a time as eighteen months, *i. e.*, a patient may no sooner have finished his course of treatment than fresh exposure may produce a complete fresh attack. The average interval between the first and second attack, in the 7 cases cited by him, was six years. In the same communication he calls attention to 18 cases of undoubted reinfection observed by his father. Of special interest is the observation of an existing double infection in an hereditary syphilitic.

Since the advent of the salvarsan therapy, reports of complete cures have increased. Such cases have in a number of instances contracted syphilis a second time, exhibiting it at times in a milder, at times in a more severe form than during the first attack. Although these observations are scattered, they demonstrate that no immunity is produced by reason of having overcome this disease.

Neisser and Finger have pointed out that no immunity existed against the virus causing the first infection, since syphilitic lesions made their appearance years after the primary infection. The conception of immunity plus re-infection in syphilis appears inconsistent in view of the fact that the recurrence of syphilitic manifestations in an infected individual are common observations. Nor can we readily assume the presence of an immunity against a subsequent infection of the pallidum, since we observe none against the one giving rise to the first attack. Clinical experience as well as experimental data have established the fact that the appearance of the primary lesion renders the superficial layers of the skin non-susceptible to a new infection. This may be due to a regional immunity, which gradually extends and is fully developed during the periods of latency; or it may be due to a non-susceptibility to foreign syphilitic virus, while the susceptibility for the virus causing the infection remains. This non-susceptibility of the skin to the virus is developed gradually. It is a fairly frequent occurrence to observe two or more indurated primary lesions situated on parts of the body which are not directly continuous, but which touch each other, as, for example, the penis and scrotum, the labia majora and minora or the upper and lower lips. These are probably examples of autoinoculation, although the possibility of a simultaneous infection in two places must be conceded.

Finger and Landsteiner conclude: "Reinoculation is successful to its proximity, in point of time, to the primary

inoculation. If general infection is not yet complete a typical chancre can be produced, but from the time when constitutional symptoms appear it becomes more difficult to succeed. During the secondary period the result has some resemblance to a secondary papule." F. J. Lambkin[73] says of the primary chancre: "It is not readily auto-inoculable, and only so during the first ten days of its existence." He found the possibility of auto-inoculation from the penis on soldiers within ten days of the existence of the primary sore. After ten days I found it impossible to reproduce an identical sore or anything like it. As a rule, a small inflammatory pustule was the only result. Hutchinson describes 3 cases of auto-inoculation before the secondary symptoms developed, and 1 case where an injury on the right index finger of a syphilitic patient in the secondary stage of the disease became infected and a typical chancre resulted. Queyrat,[74 75 76] made nineteen auto-inoculations within eleven days after the appearance of the primary lesion. Taylor was able to observe positive takes fourteen days after the initial lesion appeared.

Levaditi, Laroche, and Yamanouchi, in studying the relation of the appearance of skin immunity during the primary stage of syphilis to the Wassermann reactions, found that inoculation was successful as long as the serum remained negative. As the disease becomes generalized the Wassermann reaction becomes positive and superinfection is no longer followed by a typical lesion.

While the initial lesion produces a non-susceptibility of the skin, this resistance to auto-inoculation does not prevent the appearance of syphilitic manifestations during the later stages of the disease.

The spreading and increase of the virus giving rise to constitutional syphilis preclude the possibility of the presence of a general immunity. There are as yet no indications in support of the possibility that the mechanism of the skin

manifestations during skin infection from without differs from that which produces the skin lesions after the disease has become constitutional.

The non-susceptibility of the skin to superinfection appears to be well marked during the secondary stage of the disease. The experiments of Finger-Landsteiner, which might give rise to doubts, are not sufficiently conclusive. The occurrence of the pallida in lesions resulting from the inoculation of non-syphilitic material for the purpose of controlling inoculation tests made on syphilitics in the secondary stage of the disease, as well as the fact that skin trauma may lead to the development of lesions containing the pallida at the point of injury, makes it impossible to arrive at a definite point of view. We face the same condition when we consider the possibility of reinoculation during the tertiary stage of syphilis. It is evident from the descriptions that the lesions resulting from such attempts at reinoculation do not present the characteristics of a primary lesion. The reaction following the injection of killed cultures of the pallida into the skin of syphilitics seems to be similar to the reaction of the tissue subsequent to attempts at reinoculation.

Neisser,[77] who has had the opportunity of studying this question on a large number of experimentally infected monkeys, found that animals which could not be reinoculated still harbored the organisms, and that animals recovered, either spontaneously or due to therapeutic treatment, were susceptible to reinoculation.

In view of these experiments it is questionable whether the present conception of immunity applies to this disease. We may in this condition be dealing, on the one hand, with a lack of power on the part of the body to react to a new infection, on the other with an altered power of the tissues to react. The assumption that the virulence of the Treponema pallidum is lessened during its stay in the body, and that therefore the different lesions characteristic of the

succeeding stages of the diseases are the result, cannot be maintained in the light of experimental data. These data show that successful inoculations of the lower animals with tissues from lesions of any of the stages of the disease invariably produce lesions containing the organisms which in no way differ from those observed in the chancre.

We are thus led to the conclusion, as pointed out by Neisser, that not the invading organisms but the tissues of the body of the host are altered, reacting to the superinfection in the secondary stage not with a primary lesion but with a papule, and in the tertiary stage with a gumma.

That we are dealing with a changed condition of the tissues is furthermore brought out by the reaction following the intradermic injection of killed cultures of the pallida and their metabolic products.

Careful work over an extended period of time is required before this problem can even approach a conclusion. The work already done, both in the laboratory and in practice, has given us a new conception of the disease which is useful and stimulating.

References

1. Schaudinn, F. Deutsch. med. Wchnschr., 1905, 31, 711.
2. Wright and Richardson. Publ. of Massachusetts Gen. Hosp., 1910.
3. Noguchi and Moore. Jour. Exp. Med., 1913, No. 2, 233.
4. Sandmann. Dermat. Ztschr., 1908, vol. xv.
5. Campbell. Jour. Am. Med. Assn., 1910, No. 20, 1597.
6. Levaditi and Petresco. Presse Méd., 1905.
7. Hermann. New York Med. Jour., 1905, No. 2, 1205.
8. Rosenberger. Am. Jour. Med. Sc., 1906, No. 1, 143.
9. Sagary and Paikard. Compt. rend. Soc. biol., 1910, No. 68, 339
10. Hirshberg. Jour. Am. Med. Assn., 1905, No. 2, 1086.
11. MacLennan. British Med. Jour., 1906, No. 2, 995.
12. Doutrelepont and Grouven. Deutsch. med. Wchnschr., 1906, 23, 908.
13. Tomasezewski. München. med. Wchnschr., 1906, 27, 1301.
14. Igersheimer. München. med. Wchnschr., 1912, 38, 2089.
15. Fraenkel, E. München. med. Wchnschr., 1907, 32, 1577.

16. Simmonds. München. med. Wchnschr., 1906, 27, 1302.
17. Levaditi. Compt. rend. Soc. biol., 1905, 58, 845.
18. Gierke, E. München. med. Wchnschr., 1906, 8, 393.
19. Beitzke. Berl. klin. Wchnschr., 1906, 24, 781.
20. Gierke, E. Centralbl. f. Bakter., 1906, 44, 348.
21. Frohwein. Med. Klinik, 1906, 17, 439.
22. Wallich and Levaditi. Compt. rend. Soc. biol., 1906, 60, 191.
23. Mohn. München. med. Wchnschr., 1906, 47, 2324.
24. Mohn. Ztschr. f. Geburtsh. u. Gyn., 1907, 59.
25. Trinchese. München. med. Wchnschr., 1910, 11, 570.
26. Fieux et Mauriac. Ann. de gyn. et obst., 1908.
27. Metchnikoff and Roux. Ann. de l'Inst. Past., 1903, 1904, 1905.
28. Bertarelli. Centralbl. f. Bakt., 1906, 41, 320.
29. Bertarelli. Centralbl. f. Bakt., 1906, 41, 320.
29. Bertarelli. Centralbl. f. Bakt., 1907, 43, 448, 790.
30. Uhlenhuth and Mulzer. Arb. a. d. Kais. Ges. Amte., 1909, 33.
31. Uhlenhuth and Mulzer. Arb. a. d. Kais. Ges. Amte, 1910, 34.
32. Uhlenhuth and Mulzer. Centralbl. f. Bakt., Ref., 1909, 44, 107.
33. Uhlenhuth and Mulzer. Berl. klin. Wchnschr., 1911, 15, 653.
34. Uhlenhuth and Mulzer. Berl. klin. Wchnschr., 1913, 17, 769.
35. Uhlenhuth and Mulzer. Berl. klin. Wchnschr., 1913, 44, 2031.
36. Uhlenhuth and Mulzer. Centralbl. f. Bakt., 1912, 64, 165.
37. Uhlenhuth and Mulzer. Arb. a. d. Kais. Ges. Amte, 1910, 34.
38. Uhlenhuth and Mulzer. Deutsch. med. Wchnschr., 1911, 2, 51.
39. Truffi. Centralbl. f. Bakt., 1909, 52, 555.
40. Neisser. Dermatol. Ztschr., 1908, 15.
41. Neisser. Arb. a. d. Kais. Ges. Amte, 1911, 37.
42. Noguchi, H. Jour. Am. Med. Assn., 1911, 57, 102.
43. Baeslack. Jour. Inf. Dis., 1913, 12, 55.
44. Grouven, B. München. med. Wchnschr., 1911, 17, 909.
45. Sowade, H. Deutsch. med. Wchnschr., 1911, 15, 682.
46. Baermann, G. München. med. Wchnschr., 1911, 30, 1614.
47. Arzt s. Kerl, W. Wien. klin. Wchnschr., 1914, 29, 1053.
48. Noguchi, H. Jour. Exp. Med., 1911, 214, 99.
49. Noguchi, H. München. med. Wchnschr., 1911, 29, 1550.
50. Mühlens, P. Deutsch. med. Wchnschr., 1909, 29, 1261.
51. Mühlens, P. Klin. Jahrb., 1910, 23.
52. Hoffmann, W. H. Berl. klin. Wchnschr., 1911, 48, 2160.
53. Hoffmann, W. H. Ztschr. f. Hyg., 1911, 68, 27.
54. Schereschewsky. Deutsch. med. Wchnschr., 1912, 28, 1335.
55. Sowade. Deutsch. med. Wchnschr., 1912, 17, 797.
56. Tomasezewski. Berl. klin. Wchnschr., 1912, 17, 792.
57. Tomasezewski. Berl. klin. Wchnschr., 1912, 33, 1556.
58. Nichols, H. J. Jour. Exp. Med., 1914, 19, 362.
59. Noguchi, H. München. med. Wchnschr., 1913, 9, 2484.

60. Uhlenhuth and Mulzer. Centralbl. f. Bakt., 1st Abt. Ref., 1913, 57, supplement 162.
61. Wile, U. Jour. Exp. Med., 1916, 23, 199.
62. Herxheimer. München. med. Wchnschr., 1905, 39, 1861.
63. Loewy, K. Archiv f. Dermat. and Syphilis, 81, 107.
64. Nakano, H. Deutsch. med. Wchnschr., 1913, 22, 1031.
65. Nakano. Archiv f. Dermat and Syphilis, 1913, 116, 264.
66. Kolmer, John. Jour. Exp. Med., 1913, 18, 18.
67. Schereschewsky. Deutsch. med. Wchnschr., 1913, 35, 1676.
68. Zinsser, Hopkins and Gardner. Jour. Exp. Med., 1915, 21, 576.
69. Klausner, E. München. med. Wchnschr., 1911, 44, 2335.
70. Krefting, R. Deutsch. med. Wchnschr., 1911, 31, 1441.
71. John, F. Volkmannoche Vortrage, 1909.
72. Hutchinson, J. Lancet, 1909, 1509.
73. Lambkin, F. J. System of Syphilis, vol. i, 190.
74. Queyrat. Annal de derm. et de syph., 1904, p. 57.
75. Queyrat. Annal de derm. et de syph., 1905, 726.
76. Queyrat. Annal de derm. et de syph., 1906, 147.
77. Neisser. Arb. a. d. Kais. Ges. Amte, 1911, vol. xxxvii.

SYPHILITIC FEVER, IN RELATION TO GYNECOLOGICAL AND OBSTETRICAL PRACTICE

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To judge by the almost complete absence of reports concerning syphilitic fever in gynecological and obstetrical literature, it is manifest that this interesting, and at times important, symptom has received no consideration by our confrères. The extensive work of Gellhorn and Ehrenfest has shown that syphilis of the internal genitals is not as rare as some of us had previously supposed. My own more limited review of a series of cases in private and clinical experience together with an analysis of the existing literature has convinced me that syphilitic fever is also not such a unique symptom, if only we would be constantly on the watch to analyze the possible factors in the cases of unexplainable fever that we so frequently observe.

The diagnosis of syphilitic fever can practically never be made with absolute certainty. There is nothing specially characteristic about the temperature curve. In the milder more common forms the fever does not rise over 100° to 100.5° with a relatively slow pulse, and lasts only a few days; in the severer type we have a remittent prolonged fever extending for weeks or even months with an evening rise of temperature to 102° or even a little higher, and

intervals of a few days at a time when the fever almost ceases. The mass of evidence concerning syphilitic fever, doubtful as it may be in the individual case, leaves no question that syphilis is at times actually responsible for the rise in temperature. Nevertheless, in analyzing such symptoms we should constantly bear in mind Virchow's warning not to call everything syphilis that appears in a syphilitic person or that disappears under antisyphilitic treatment. Thus we can explain fever that disappears under antiluetic treatment in four different ways:

1. The antiluetic treatment may have destroyed not only the spirochete but also septic bacteria that were the cause of the fever.

2. The antiluetic treatment may have so improved the patient's bodily resistance as to enable her to overcome fever due to other organisms.

3. The antiluetic treatment may have been merely coincident with a fall of temperature due to other causes.

4. The antiluetic treatment may actually have been responsible for the cessation of a fever due to syphilis.

On the other hand we cannot conclude that a fever is not syphilitic because it ceases without antiluetic treatment, since we know that syphilis and all its manifestations are to a certain degree limited by the natural immunity acquired by the individual. Nor can we conclude that a fever is not syphilitic because it persists in spite of antiluetic treatment, since we know that certain cases of malignant syphilis will resist all known measures.

Scientific proof of syphilitic fever in any case would require the exclusion of all other possible causes, the finding of Spirochete pallida in the blood before treatment and the simultaneous disappearance of spirochetes and fever under the customary treatment. These conditions it will of course for technical reasons be impossible to fill in more than a very few cases. In the main we must arrive at our

diagnosis, possible or probable, by a careful estimation of the patient's history, physical condition, Wassermann reaction and the effect of the treatment.

Syphilitic fever may be divided into:

1. Secondary syphilitic fever.
2. Late secondary syphilitic fever.
3. Tertiary syphilitic fever.

1. *Secondary syphilitic fever* is that which we find preceding or coincident with the outbreak of the syphilitic rash. Fournier states that it occurred in about 20 per cent. of all syphilitics. The rise is not over one or two degrees, and the duration three or four days, so that the patient ordinarily gives it no attention. At the outbreak of secondaries women often come to the gynecologist either because of local sores or on account of a complicating gonorrhea or pregnancy. It would be well, therefore, for us to bear in mind, that a slight rise of temperature at this time has no special significance. Whether it is individual predisposition or a virulent infection that is responsible for the occurrence of fever in one out of every five syphilitics at the time of the rash it is impossible to say. Occasionally we find that the fever is high and persistent. An illustration of this sort occurring in an obstetrical patient was noted in the following case, the data of which were kindly given me by Dr. Ehrenfest.

Mrs. X., aged twenty-nine years, married February 1, 1915, in good health, began, on April 15, to have a peculiar intermittent fever, diagnosed by her family physician as typhoid, that lasted for six weeks. Shortly thereafter, she was seen by Dr. Ehrenfest who found a faint secondary skin rash still visible and a suspicious sore on the labium minus. Widal reaction was negative and no other explanation for her fever could be found. Both the patient and her husband had a Wassermann 4+. The patient was thin and anemic and at this time was three months pregnant. Under salvarsan and mercury a marked improvement of

her general condition and increase in weight occurred. There was no return of the fever.

Several similar cases are recorded by Konrad although not in obstetrical or gynecological patients.

2. *Late secondary syphilitic fever* offers greater diagnostic difficulties and is less frequent than that coincident with the eruption. Graves has emphasized the occasional recurrence of short periods of elevation of temperature associated with other so-called constitutional symptoms in syphilitics for some months after the onset of the disease. He interprets such symptoms as due to the occasional outbreak of organisms accumulating in a latent syphilitic person. In such as are susceptible to elevations of temperature we may have at these times a short period of fever.

Every now and then this late secondary fever will be more persistent and have a higher range of temperature. A characteristic example of this group was reported by me six years ago (*Surgery, Gynecology and Obstetrics*, 1910, ii, 71). A brief summary may be of interest in this connection.

C. W., aged twenty-three years, contracted syphilis about the middle of her pregnancy. The following month a typical papular eruption, sore throat and adenitis occurred. She was put on bichloride of mercury by her physician and the eruption began to fade. Two months later I was called to see her on account of a fever starting four days previously, running up to 103° without apparent cause. Typhoid, tuberculosis, pyelitis, sepsis and appendicitis could be excluded. The persistence of fever up to 102° to 103.5° for the next ten days induced me to decide on premature labor with the hope of clearing up the diagnosis. Delivery of a living $4\frac{1}{2}$ pound child accomplished without trouble. The fever persisted for three days more without any apparent cause, rising to 104° on the second day postpartum. I finally decided on the possibility of syphilis as a factor in the fever and gave bichloride of mercury grain $\frac{1}{10}$ hypo-

dermically on two successive days. The fever ceases at once and did not return.

Another less pronounced case came to my service at the City Hospital March 23, 1916. She was a negress who had been normally confined ten days previously. No evidence of pelvic infection or other inflammatory disease elsewhere in her body could be determined. Her skin still showed typical papular syphilitic spots that had appeared several weeks previously. Enlarged post-cervical and inguinal glands, Wassermann negative. During the first six days she ran a somewhat irregular fever running up as high as 102°. She was then given two hypodermics of mercury benzoate on alternate days. The fever promptly ceased and did not return during the following two weeks at which time she left the institution. In spite of the negative Wassermann, I think we should strongly suspect syphilis as the cause of the fever in this patient.

Leblond in 1890 also reported a case that belongs under this head. The patient had contracted syphilis during her pregnancy. Under antiluetic treatment the syphilitic manifestations disappeared. Fetal movements ceased at the sixth month of pregnancy. No treatment was given for the following five weeks. Then a seven and one-half months dead fetus was spontaneously expelled. No abrasions in genital tract. No fever for the first seven days postpartum. Without any local symptoms or explanation elsewhere in her body, the patient began to have a high remittent fever with slow pulse, good appetite and complete absence of pain or discomfort. Antiluetic treatment resulted in prompt and permanent cessation of fever.

3. *Tertiary syphilitic fever* is much less frequent than the secondary types, but is clinically of greater importance. The fever is usually continuous, rising to 102° to 103°. Evidences of the syphilitic infection have long since disappeared and the symptoms forgotten by the patient. The

diagnosis is therefore established with great difficulty and usually after considerable delay. To the 62 reasonably certain cases tabulated by Stern in 1912, I was able to add 21 additional cases including 1 of my own, making a total of 83 cases in all. The organs primarily affected by the tertiary process in these cases were:

Liver	29 times
Bones and joints	19 "
Lungs and air passages	11 "
Nervous system	6 "
Spleen	4 "
Circulatory system	3 "
Hereditary	3 "
Female genitalia	1 "
Uncertain	7 "

The gummatous lesions upon the skin as well as those occurring so frequently about the external genitals of women and in the rectum do not apparently give rise to this tertiary syphilitic fever. Occasional slight elevations of temperature such as we find are more probably due to secondary infection of the ulcer. It is the deep seated gummata such as we find in the liver and osseous system that are most apt to give rise to this symptom. It is however, not merely the extent of the syphilitic infiltration that is to be held responsible. Glaser reports a case of syphilis of the lung with complete consolidation of one lung but a normal temperature. Extensive liver infiltrations occur without fever; in fact, the absence of fever has been emphasized in differential diagnosis as pointing to syphilis. These exceptional cases of tertiary syphilitic fever must therefore be carefully kept in mind. Abdominal surgeons have at times mistaken the fever and liver enlargement in liver syphilis for a cholecystitis. Riedel reports having made this mistake five times.

In our special field, tertiary syphilitic fever may be subdivided into:

1. Cases in which tertiary syphilis of the genital tract caused the fever.

2. Cases in which a gynecologic or obstetrical condition was complicated by tertiary syphilis in other organs.

1. The interesting cases of uterine syphilis reported by Gellhorn and Ehrenfest were in part attended by tertiary gummatous infiltration of the neighboring connective tissue. I had occasion to examine most of these patients personally and some were for a time in my service at the City Hospital. In going over the temperature charts of three of these cases, those in which there was the most pronounced gummatous infiltration of uterus and parametrium, I found that all three ran a temperature on admission that could not readily be explained except on the basis of their syphilis. In observation X (B. L. 7307–13) the admission temperature was 101°, but the subsequent records are missing. In observation VI, (M. B., 10612–16) at the time of admission in November, 1915, when the cervical lesion was comparatively small the temperature went up to 99.5° to 100° for four days after admission. On her second admission in January, 1916, the cervix and surrounding parametium was converted into a nodular mass such as I had never seen except in carcinoma. Only the histologic picture could convince me that this mass was really a gummatous infiltration. This woman ran an irregular fever ranging from 101° to 103.8°, in the evening. While there is no denying that the ulcer was secondarily infected, the syphilitic process was essentially the cause of her death and in view of the malignancy of the condition, and the absence of any particular symptoms from the secondary infection, the probability is that the fever was due, at least in part, to syphilis.

I should draw a similar conclusion from the data at hand concerning the case of malignant syphilis of the uterus reported by Hoffmann. Hoffmann speaks of the case as one of chronic sepsis following childbirth. The colon bacillus

was, to be sure, found in the blood culture; nevertheless, autopsy findings revealed not the picture of a severe colon infection, but that of extensive gummatous infiltrations in the uterus, right tube and ovary, retroperitoneal glands, lung and liver. I think the question may fairly be raised whether the fever in this case was not due to spirochete sepsis.

Turning now from these merely suspicious cases of tertiary syphilitic fever we come to one concerning which there can be little doubt as to the correct diagnosis. It was reported as observation XV (Gellhorn and Ehrenfest).

J. L., (Admission No. 4048–15), colored, twenty-eight years old. No miscarriages. One normal confinement ten years previously. Entered hospital because of a blood-tinged vaginal discharge with pain in the right lower abdomen. Examination revealed edema of both labia majora and minora with a small typical tertiary ulcer under the right labium minus and an indurated urethral tube. Cervix encased in an infiltration extending to the pelvic wall. Wassermann 4+. There was no hyperleukocytosis nor any such high fever as you would expect with a large acute pelvic exudate due to septic infection. The bedside notes attached to the history shows that there was a rise of temperature, and moreover one that reacted so distinctly to the anti-syphilitic treatment that there can be no reasonable doubt of the diagnosis: *tertiary syphilitic fever*. The exact description of the changes wrought by the treatment upon the pelvic mass are equally convincing and are mutually corroborative of the nature of the affection. For a detailed history and description of the physical examination I would refer the reader to the article by Gellhorn and Ehrenfest on "Syphilis of the Internal Genital Organs" in the Referat on Syphilis, American Gynecological Society, p. 232–233.

The accompanying temperature curve is very instructive. The temperature ranged from 100° to 102.4° from June

25, the day of admission, to July 3, when the patient was first put on unguentum hydrargyri and increasing doses of potassium iodide. The temperature fell to normal for a few days and then began again to become elevated, though not as high as before. Immediately subsequent to the injection of 0.6 salvarsan on July 13 the fever ceased completely and did not return.

Cases in which a gynecological or obstetrical condition is complicated by tertiary syphilis in other organs producing fever, are occasionally to be found. Two such cases have been recently reported by Glaser. One patient, the wife of a contractor, developed an intermittent high fever following confinement. There was a swelling of both liver and spleen but no indication of pelvic infection. Malaria, septicemia, and typhoid could be excluded bacteriologically. The husband acknowledged syphilis. In spite of a negative Wassermann, salvarsan was given with sudden and complete cessation of fever and a disappearance of the enlargement of the liver and spleen.

The other case developed a persistant fever after a hysterectomy. No cause for this was apparent. A secondary laparotomy threw no light on the subject. Pains in the lower limbs suggested a luetic periostitis. Wassermann reaction found to be 4+. Antiluetic treatment brought immediate cessation of fever, a gain of 18 pounds in weight and disappearance of the bone symptoms.

Such cases should put us on our guard in every case of obscure, persistent fever, complicating a pelvic condition, to have a Wassermann reaction made and to try the effect of antiluetic treatment.

Cause. The cause of syphilitic fever has been the subject of considerable debate. Some insist that we must explain it on the basis of a secondary infection with other bacteria (Rosenthal, Kirchheim), but the majority feel that the evidence at hand justifies positively the conclusion that the

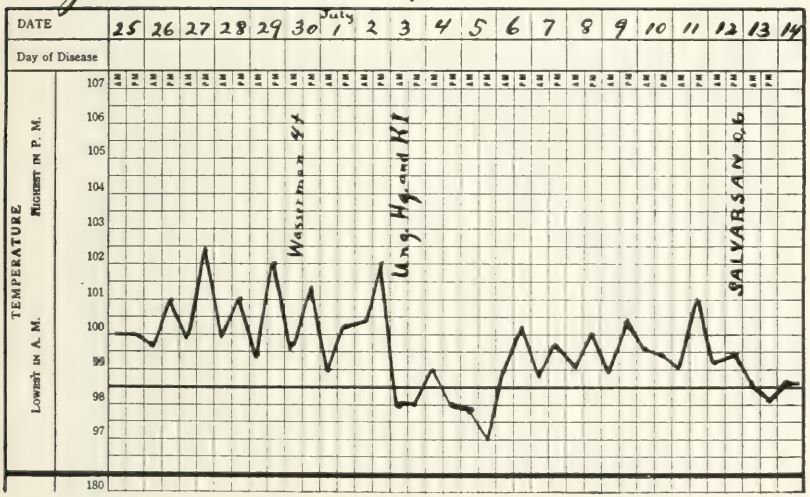
CITY OF ST. LOUIS

HOSPITAL DEPARTMENT

CITY HOSPITAL

Admission No. 4048

Name J. L. Admitted June 25-1915 Ward



fever is due to the spirochetes and their toxins. Sobernheim considers it possible that the rise in temperature is due merely to the absorption of products of tissue necrosis and is therefore independent of the organism itself. If this were true, however, we should not expect so immediate an effect upon the temperature from antisyphilitic treatment but rather a gradual cessation of fever. Schleglmann and others believe that when syphilis attacks the liver, we are more apt to have fever, since interference with the metabolism of that organ causes elevations of temperature. In this connection, Stern points out the frequent association of fever in the secondary stage of syphilis with a mild degree of icterus indicative of interference with liver function. Monier and Fournier believe syphilitic fever is more frequent in women than in men but this statement has not been sufficiently confirmed. The most plausible explanation why some have fever and others do not is that put forward by Stern. In syphilitics without fever it is possible that only the spirochetes enter the circulation, while in those having fever the spirochetes plus their toxins get into the blood and it is the latter that produce the rise in temperature.

Additional information as to the cause of syphilitic fever may come out of our study of the rise of temperature that is occasionally seen after injections of mercury or salvarsan. Polano found in 12 out of 106 cases of secondary lues a temporary elevation of one or two degrees after mercurial injections. Gron reports a similar occurrence in 10 out of a 100 cases. Glaser found that such a rise of temperature after salvarsan or Hg. injections given with the utmost precautions occurred with greater frequency in latent lues. He explains the symptom as due to the death of large numbers of spirochetes. The resultant liberation of their endotoxines produces sufficient irritation to produce a moderate degree of fever. Bauer also found a rise of temperature after the first injections in liver syphilis.

To summarize then:

1. The diagnosis of syphilitic fever can rarely be made with absolute certainty; but we should more often consider it as a possibility, and institute antiluetic measures in suitable cases.

2. Secondary syphilitic fever occurs in a mild form in 20 per cent. of patients at the outbreak of the rash and at times is prolonged and more severe in its course.

3. Late secondary syphilitic fever is occasionally seen in a pronounced form after confinement or in gynecological patients.

4. Tertiary syphilitic fever is practically never due to syphilitic lesions in the female genital tract. One such case is reported by the author. It may however, complicate a gynecological or obstetrical condition and owing to the difficulty in locating the site of the tertiary lesion, lead to a wrong diagnosis as to the cause of the fever. All doubtful cases should be subjected to a Wassermann test and if positive, given antiluetic treatment.

5. Syphilitic fever is probably due to the reaction of the body to the toxins produced by the spirochete which under certain circumstances or in certain individuals gain an entrance into the circulation.

Bibliography

Albanus. Russki Wratsch, 1908, Nr. 1.
d'Amato. Schmidt's Jahrbücher, 1906, p. 300.
Baeumler. Deutsch. Arch. f. klin. Med., 1872, p. 400.
Barry. Indian Med. Gaz., 1904, p. 298.
Bassett-Smitz-Hasler. Lancet, December 22, 1900.
Bauer. Lues und innere Medizin, Deuticke, 1910.
Beurmann. Ann. de Dermat., 1894, v, 829.
Birt. Montreal Med. Jour., October, 1905.
Bjalokur. Praktischeski Wratsch, 1910, ix, 730.
Bjalokur. Russk. Monats., September, 1913, rev. in Derm. Wchnschr., 1913, No. 3.
Bogroff. Russk. J. Kozhn., 1914, xxvii, 50.

Bozzolo. München. med. Wchnschr., 1904, p. 590.
Bristowe. Clinical Society's Transactions, London, 1886, p. 249.
Cappello. Gazetta. d. Osped. e. d. Clin., 1914, No. 20.
Carducci. München. med. Wchnschr., 1905, p. 532.
Carpenter. New York Med. Record, lxix, 412.
Caro. Deutsch. med. Wchnschr., 1899, p. 580.
Ceconi. Schmidt's Jahrbücher, 1908, p. 298.
Dammert. Deutsch. med. Wchnschr., 1908, xxxiv, 1507.
Dorendorf. Charite-Annalen, 1901.
Ewald. Therapie der Gegenwart, 1903.
Fournier. Jour. de Med. et de Chirurg. Prat., 1889, Janvier.
Frey. Mediz. Klinik, 1910, vi, 1815.
Futcher. New York Med. Jour., 1901, p. 1065.
Gellhorn and Ehrenfest. Trans. Amer. Gyn. Soc., 1916.
Gerhardt. Berlin. klin. Wchnschr., 1900, p. 1046.
Geronne. Therapie d. Gegenwart, January, 1907.
Gjestland. Norsk. Mag. f. Laegevidensk, 1912, ix, 1044.
Glaser. Berlin. klin. Wchnschr., 1910, No. 27.
Glaser. Berlin. klin. Wchnschr., 1913, No. 26.
Gottschalk. Med. Klinik, 1910, p. 1655.
Graves. Medical Record, August 24, 1912.
Gron. Ann. de Dermat., 1910, p. 461.
Guntz. Das Syphilitische Fieber, Leipzig, 1873.
Hermann. Med. Klinik, 1910, vi, 1015.
Herzheimer. u. Krause. Deutsch. med. Wchnschr., 1902, No. 50.
Heubner. Arch. f. klin. Mediz., vol. lxiv.
Hewlett. Lancet, 1904, p. 658.
Hoffmann. Ztschr. f. Geb. u. Gyn., 1911, lxix, 482.
Huber. Therapie d. Gegenwart, 1911, No. 2.
Huzar. Wien. klin. Wchnschr., 1913, No. 13.
Imhof-Bion. Med. Klinik, 1909, v, 766.
Janeway. Am. Jour. Med. Sc., September, 1898, p. 251.
Janowski. Prager Viertelj. f. Prakt. Heilk., 1874, xxxi, 51.
Jordan. Arch. f. Dermat. u. Syph., 1911, cviii, 513.
Judin. Russk. Ztschr. f. Haut. u. Ven. Krankh., 1901, ii, 58.
Kayser. La Syphilis, January, 1905.
Kirchheim. Deutsch. med. Wchnschr., 1911, No. 4.
F. Klemperer. Ztschr. f. klin. Mediz., 1905, lv, 176.
G. Klemperer. Therapie d. Gegenwart., 1903.
Koenig. Berl. klin. Wchnschr., 1905, p. 137.
Koermoeczi. Ungar. Med. Presse, October 4, 1905.
Kohan. Yezhennes Ushn. Gorlov Nosov. Boliezn., St. Petersburg, 1914, xix, 227.
Konrad. Gyogyaszat, 1913, No. 9, rev. in Dermat Wchnschr., 1915, No. 7.

Kraus. Wien. klin. Wchnschr., 1913, p. 2037.
Krause. Deutsch. Arch. f. klin. Med., 1905, vol. lxxxiii.
Lasarew. Russk. Ztschr. f. Haut. u. Ven Krankh., 1908, xv, 289.
Leblond. Bullet. Medic., 1890, No. 47, rev. in Ann. de Dermat., 1891, ii, 258.
Levin. Schmidt's Jahrb., 1881, cxcii, 322.
Lindenheim. Berl. klin. Wchnschr., 1907, No. 11, p. 300.
Lippmann. Therapie d. Gegenwart, 1904.
Lowenberg. Med. Bull., Philadelphia, 1906, p. 173.
Mannaberg. Ztschr. f. klin. Mediz., 1907, lxii, 253.
McKenna. Med. News, New York, 1905, p. 1126.
Mense. Arch. f. Schiffs u. Tropenhygiene, 1908, Beih. 5.
Monier. Thèse de Bordeaux, 1899, rev. in Ann. d. Dermat., 1899, x, 1012.
Morgan. Philadelphia Med. Jour., 1900, p. 360.
Newman. Medical Record, January, 1908.
Papee. Przegl. lek. Krakow, 1914, liii, 299.
Pariser. Deutsch. med. Wchnschr., 1908, xxxiv, 1510.
Phillips. British Med. Jour., 1889, p. 1217.
Poirier. Rev. in Monatsh. f. Prakt. Dermat., 1909, xlix, 23.
Polano. Berl. klin. Wchnschr., 1907, xliv, 1597.
Power and Murphy. A System of Syphilis, vol. i.
Pozzili. Gazetta d. Osped. e d. Clin., 1912, No. 80, rev. in Dermat. Wchnschr., 1913, No. 3.
Prentiss. Philadelphia Med. Jour., 1899, p. 215.
Raubitschek. Zentralbl. f. Grenzgeb. d. Med. u. Chir., 1907, ix, 22.
Remskaya. Russki. Wratsch, 1912, No. 38.
Reye. Therapie d. Gegenwart., 1905, vii, 355.
Riedel. Mittheil. a. d. Grenzgeb. d. Med. u. Chir., 1905, xiv, 1, 2.
Rolleston. Lancet, March 30, 1907.
Rosenbach. Berl. klin. Wchnschr., 1906, No. 35.
Sasaki. Japan. Ztschr. f. Dermat. u. Urol., 1912, xii, 12.
Savill. Clin. Jour., London, 1897, p. 87.
Scalese. Rev. in Monatsh. f. Prakt. Dermat., 1904, xxxviii, 520.
Schleglmann. Deutsch. med. Wchnschr., 1911, p. 1218.
Schuster. Arch. f. Dermat., 1873, v, 283.
Senator. Berl. klin. Wchnschr., 1902.
Siebert. Arch. f. Schiffs- u. Tropenhygiene, 1907, xi, Beih., 7.
Siredey-Lemaire. La Syphilis, Juillet, 1904.
Sobernheim. Therapie d. Gegenwart, 1905, No. 11.
Stern. Arch. f. Dermat. u. Syph., 1912, cxiii, 1061.
Strassmann. Deutsch. Ztschr. f. Nervenheilk., xl, 5.
Stuempke. Berl. klin. Wchnschr., 1910, p. 1821.
Taussig. Surg., Gyn. and Obst., 1910, xi, 71.
Tebart. Rev. in Dermat. Zentralbl., 1906, No. 1.

Treumann. München. med. Wchnschr., 1907, p. 963.
Vagda. Vierteljahresschr. f. Dermat. u. Syph., 1875.
Veress. Pesther Med. Chirurg. Presse., 1904.
Verotti. Rev. in Monatsh. f. prakt. Dermat., 1909, xlviii, 183.
Weber. Lancet, March 16, 1907.
Westphalen. St. Petersburger Med. Wchnschr., 1906, No. 36, p. 440.
Williams. Lancet, 1900, p. 1577.
Zentler. Thèse de Paris, 1903, rev. in Monatshf. f. prakt. Derm., xlii, 54.
Zinn. Charite-Annalen, 1895.

DISCUSSION ON THE PAPERS OF DRS. SLEMONS, NORRIS, BAESLACK AND TAUSSIG

Dr. Brooke M. Anspach.—Dr. Philip Williams, of Philadelphia, was here yesterday and had intended to take part in the discussion, but he was obliged to go without an opportunity; if you will give me the privilege, I will speak for him at this time.

He and Dr. John Kolmer have been interested in the incidence of syphilis in gynecological cases and have studied a series of three hundred patients in the gynecological and obstetrical services of the hospitals with which they are connected; they found a positive Wassermann reaction in 22.6 per cent. I will not give in detail, the notes Dr. Williams left with me. He is particularly interested in the relatively high percentage of positive reactions observed in the following conditions: A positive reaction is 75 per cent. of stillbirths; 50 per cent. in rectal disease; 43 per cent. in abortions; 36 per cent. in pelvic inflammatory cases; 16 per cent. in fibroid tumors of the uterus, and 17 per cent. in cases of pregnancy. There seems to be a decided difference between negresses and white women. In the negresses there were 35.8 per cent. positive reactions as compared with 20.2 per cent. in the white women. Some of these reactions, which were put down as positive, I think were weakly positive.

My feeling is that there must be some error either in the application of the Wassermann test as it is commonly done, or in the significance which is attached to a positive reaction.

I do not believe that syphilis is as common as it at present seems to be.

So far as the diagnosis of syphilis clinically is concerned in obstetrical and gynecological practice, it has certainly not been very frequent in my practice among the well-to-do middle classes. I have recognized no more than one primary sore in private practice, if my memory serves me well; in the lowest strata of society, syphilitic lesions of the external genitalia are more commonly observed.

So far as gross local conditions within the pelvis are concerned, *e. g.*, syphilitic lesions of the body of the uterus, tubes and ovaries, it is true that they are very rarely observed. However, I do not see why we should expect to see many of them because syphilis is a constitutional disease, not a local one, and its principal primary and secondary lesions are surface lesions.

Dr. Collin Foulkrod.—With reference to the paper of Dr. Taussig regarding syphilitic fever, I have seen one case. Because it is mentioned by Dr. Taussig in his paper, it might be well to give a *résumé* of her subsequent history, In the first part of the pregnancy before Dr. Ehrenfest had her under his care the patient developed fever, which was diagnosed, at first, as typho-malarial. She was cared for as typhoid and observed for six weeks, finally recovering, without any antisyphilitic treatment having been given at that time. She then came under Dr. Ehrenfest's care and he discovered that both her Wassermann and that of her husband was + + + +. She was placed under the care of a syphilographer who gave her antisyphilitic treatment. She came to me in Philadelphia and was placed under Dr. Bonney's care as syphilographer, receiving another dose of salvarsan. At this time there was quite an epidemic of influenza in Philadelphia. Her temperature ranged from 99° to 100°, we being unable to determine whether this temperature was due to the attack of influenza evidently present or to the excitation by it of the syphilitic fever. This continued with the presence of an acute arthritis of the left knee until her delivery January 18, 1916. Immediately after delivery her temperature rose to 101°–102° without any positive manifestations or evidences of infection from the influenzal bacilli or streptococci. She had recently been given a dose of salvarsan, but it was not repeated because of the presence of

albumin in urine. At the end of a week or ten days when the fever was running 101°–102°; after finding she was losing ground, we decided to venture to give another dose of salvarsan, which was done, and the next day her temperature came down to normal and had remained so. She passed through a normal convalescence. The child died within two weeks after birth. We were unable to get an autopsy. I think the result in the mother confirms the primary diagnosis that it was syphilitic fever which was reduced or allayed absolutely by antisyphilitic treatment. There was no localizing condition in the pelvis at the time, nor was there any local inflammatory condition either syphilitic or otherwise.

Dr. Fred L. Adair.—There were some points I did not make in my paper yesterday, one of which is in regard to hydramnics. Two cases out of eleven were associated with syphilis, in one of which we had definite evidences of congenital syphilis. A second point concerns hemorrhage of the newborn, out of five cases we found two which were definitely syphilitic. This is an important point, and while it has been called to our attention rather casually, at the same time I do not believe it has been sufficiently emphasized that syphilis is a fairly frequent accompaniment, if not the cause, of hemorrhage in the newborn.

With regard to habitual abortion, I have had very few cases of well marked habitual abortion—only three, but in none of these was I able to demonstrate syphilis by the Wassermann test or other means.

The incidence of syphilis in our series of cases was between 5 and 6 per cent. The incidence of syphilis in the macerated fetuses was approximately 50 per cent. In stillbirths the cases in which syphilis was demonstrable make up approximately 25 per cent., and in premature births about 15 per cent.

Dr. J. Morris Slemons.—It is my impression that the diagnosis of syphilis is made too freely in early infancy. We keep in close touch with infants after they are discharged from the obstetrical department, and have frequently found that upon the appearance of snuffles or sore buttocks or skin lesions and without further evidence the tendency is to consider that the child has congenital syphilitis. Time and again the placenta records in such cases have given the infant a clean bill of health. It seems to me, therefore, a matter of duty with the obstetrician to examine the placenta in every case. If one depended upon

the placenta alone, I believe he would miss a few of the cases of fetal syphilis. On the other hand, if the Wassermann reaction was depended upon exclusively the diagnosis would be positive somewhat too frequently. Under these circumstances both tests should be made, and the findings interpreted in the light of the clinical history.

Dr. Frederick J. Taussig.—I should like to add one observation to those reported by Dr. Gellhorn and Dr. Ehrenfest of leukoplakia of the cervix. I had occasion to see a patient at the City Hospital in whom there were secondary manifestations of syphilis with a four plus Wassermann, who presented several whitish plaques upon the cervix. A piece of the cervix was removed for histological examination and the typical histological picture of leukoplakia was seen.

Dr. Hugo Ehrenfest.—I shall leave it to Dr. Gellhorn to discuss the various contributions presented in this symposium as far as they refer to the changes brought about by syphilis in uterus and adnexa, and shall limit my remarks to the important question of the infection of the fetus in utero. Also this problem, though only briefly, is touched upon in our printed essay. Dr. Davis defends the theory of paternal infection by stating that syphilis is conveyed to the mother most frequently through the medium of the ovum. Dr. Pollitzer, undeniably more in harmony with modern views, objects to this conception of fetal infection. The child in utero is infected by its syphilitic mother. "The mother's blood is flooded with spirochetes." These are carried into the fetus through the placenta by way of fetal circulation.

The point I wish to make is that certain of our findings, corroborating earlier workers in the field like Graefenberg, suggest still another possibility of infection of the child during its intra-uterine life. We mention two instances in which spirochetes were found in the cervical secretion of women who at that time did not show any manifest symptoms of lues. In one patient I discovered them in an Indian ink smear of cervical discharge made as a part of a routine. A Wassermann reaction then ordered was found positive and at the same time accidentally ascertained that the patient's husband also was in the hospital for the treatment of some luetic lesions.

The occasional presence of spirochetes in the cervical or better in the uterine secretions of a latent syphilitic woman

naturally permits the deduction that in the course of pregnancy at any time in this manner spirochetes may enter the ovum. If at such time the fetus is far advanced in its development he may not necessarily be destroyed by the infection as probably is the case whenever the spirochetes reach an embryo in its earlier existence.

Theoretically we cannot admit the possibility of a spirochete entering the ovum simultaneously with the spermatozoid. Such an occurrence could result only in the destruction of the ovum. Only the identical result could be expected from the direct invasion of paternal spirochetes into the fertilized ovum within the first ten or twelve weeks of its development. Later, as the result of the obliteration of the uterine cavity through the agglutination of the two deciduæ, paternal spirochetes would be unable to reach the ovum. Therefore, the mode of infection suggested by us, while admitting the possibility of the entrance of spirochetes into the ovum independent from placenta, cannot be regarded as a support of the theory of direct paternal infection, today generally regarded as obsolete.

Dr. Adair's figures support the contention, now rather generally made, that syphilis does not play the important role in the causation of abortion formerly ascribed to it.

We discussed in our monograph the relation of uterine hemorrhages to syphilis and showed that the syphilitic woman as the result of the commonly associated gonorrhea and as the effect of preceding abortions often develops definite uterine lesions causing metrorrhagias. These hemorrhages, therefore, actually hold only a very indirect relation to the syphilis which in the meantime may have been successfully treated. In the same manner abortions in syphilitic women may and often are not the direct result of the syphilis but are due to pathologic but not syphilitic changes in the endometrium (Trinchese, etc.).

I cannot join Dr. Davis in his warning against the use of salvarsan during pregnancy. The patient of mine, mentioned both by Dr. Foulkrod and Taussig, received several doses of salvarsan apparently with success. Though infected herself only at the time of impregnation she carried to full term. Literature contains many large statistics seemingly proving the value of salvarsan during pregnancy.

Dr. Baeslack touched on the question of personal susceptibility or predisposition. In our studies concerning uterine lesions

due to local spirochetal infection we met with the rather striking fact that local lesions in the uterus are rare in spite of the undeniable fact that the uterus more than any other internal organ is exposed to direct contamination with spirochetes. They must reach the uterine cavity with the semen or from luetic lesions on the cervix which in our belief are not uncommon. Once more I must mention in this connection the presence of spirochetes in the cervical secretions of women in the latent stage. This absence of lesions in the uterus in the light of our present knowledge can be explained only in two ways: either there exist different varieties of spirochetes characterised by a difference in their affinity to certain tissues, or the uterine tissue exhibits a particular lack of susceptibility for the development of luetic lesions an assumption well in accord with clinical observations. Dr. Baeslack informs us that there is only one type of Spirocheta pallida which forces the deduction that spirochetes do not find a suitable field for development in the endometrium or myometrium. Whether the presence of arsenic in the endometrium bears any relation to this fact is a question which we are studying at the present time. But even this one feature, a minor one in the entire large problem, will bear out our contention that a thorough familiarity with the local manifestations of syphilis in the genital tract of the female today seems indispensable for the gynecologist.

Dr. George Gellhorn (closing).—The fact that the Congress, the American Dermatological Society, the American Laryngological Society and our Society have independently of one another selected as one of their official subjects the effects of syphilis upon the human body, shows that this is the psychologic moment to discuss the various manifestations of syphilis, and this is particularly true in our field where so little of actual value has been known up to the present time; for while the literature up to 1906 fairly teemed with reports of syphilitic affections in the field of gynecology, these reports have markedly decreased since the Wassermann reaction came into general use, and the discovery of the Spirocheta pallida has made greater demands upon the accuracy of the reports.

Dr. Ehrenfest and I have endeavored in our referat to collect the available data and sift them critically so as to submit to you the present status of knowledge, but we realize that this is only a beginning, and it will require the coöperation of all of us to

build upon this basis and to ascertain the actual influence of syphilis upon the female body. That there is much to be learned is shown by the fact that just as soon as we two began to concentrate our attention upon this subject we found a large number of cases which previous to that time we had overlooked, and I am quite sure that in the years to come there will be brought forth a larger number of reports of this kind.

Referring to the paper of Dr. Norris, I am glad to see that he has accepted our suggestion that the so-called syphilitic menorrhagia has nothing to do with the uterus itself, and that it depends almost altogether not upon any local lesion of the ovary but upon the systemic poisoning by the spirochete and its effect upon the function of the ovary. His case of syphilis of the uterus, however, does not seem convincing to me. Here is a patient with syphilis who has had three abortions, the last one of the three abortions taking place five months previous to the date of her entering the hospital. She had persistent bleeding from the uterus for which she was dilated and curetted. During this procedure, the uterus was perforated. Dr. Norris ascribes the friability of the uterus to syphilis and adduces the microscopic findings as a final proof. Unfortunately, the histologic picture of the syphilitic uterus is not pathognostic. We find the same changes in the bloodvessels and the same perivascular infiltration in all chronic inflammations, and I would rather think the perforation in this case was due to an abnormal friability caused by the repeated miscarriages which had occurred in a fairly short period of time.

The reason why primary chancres are not observed more frequently in the uterus, tubes and ovaries, as mentioned by Dr. Anspach, is obviously due to the affinity of the spirochete for squamous cell epithelium. The columnar epithelium above the external os seems to represent an effective barrier to the primary nidation of the spirochetes, although, theoretically, the motility of the spirilla would enable them to gain access to the higher portions of the genital tract.

There is one point to which I desire to call attention because it is of very great practical value, and that is the infectiousness of physiological secretions in a syphilitic woman. We know that syphilitic ulcers and chancres are full of spirochetes and are therefore highly infectious. But if a woman is syphilitic and has no local manifestations upon the vulva, the vagina or

the cervix, she yet may be highly infectious. Graefenberg has succeeded in finding spirochetes, in four cases, in the cervical secretions of an otherwise normal uterus, and we have succeeded twice in demonstrating the spirochete in women who had absolutely no local manifestations upon the genital tract, in whom the cervical secretions were absolutely clear and normal, and yet contained spirochetes. The practical value is evident. We must hereafter pay more attention to the rountine examination of the physiological secretions in syphilitic women, and the time may not be far distant when an ultramicroscopic examination of cervical secretions for spirochetes will be just as much a routine method as the search for gonococci. The menstrual blood in a syphilitic woman may have exactly the same infectiousness. We have not succeeded in demonstrating spirochetes in menstrual blood for the reason that the demonstration of them in blood is extremely difficult as anyone knows who has tried to do this work. The findings of McDonagh and Ross in England are suggestive and they have been confirmed by other investigators.

Another very important point is the prevalence of latent syphilis in women. One observer found as high a percentage as 75 of positive Wassermanns in women who had no history or manifestations of syphilis. If the Wassermann reaction will be employed more generally than it has been possible in the short nine years since it has been introduced, I am quite certain that there will be a large number of cases that heretofore have resisted all our efforts at cure which can be treated by antiluetic treatment. It is, perhaps, not too much to say that then a good deal of the popular local treatment will be dispensed with; many curettages, amputations of the cervix, and hysterectomies may be found to be superfluous, and the *furor operativus* which threatens to transform gynecology into a purely surgical specialty, may be held within reasonable bounds.

THE VARIATIONS IN THE BLOOD SUPPLY OF THE OVARY AND THEIR POSSIBLE OPERATIVE IMPORTANCE

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In conservative operations on the pelvic organs of women the object of the surgeon should be not only to save ovarian tissue but to leave it in such condition that it may properly perform its function and may not later cause discomfort to the patient. In order to accomplish this a knowledge of the blood supply of the ovary is of importance. He should consider not only its actual blood supply but especially its potential, for in these operations the actual blood supply may be more or less disturbed and must be replaced by the potential. The present study was undertaken for its anatomical interest and also for a better knowledge of the blood supply of the ovary as bearing on operations when a tube is removed without removing the ovary of that side, or the uterus is removed, leaving one or both ovaries. The intrinsic bloodvessels of the ovary and resection of that organ are not considered. The intrinsic bloodvessels of the ovary have been very carefully described by Clark. (See Contributions to the Science of Medicine, *Johns Hopkins Press*, 1900.)

The material for this study consisted of six fetal tubes and ovaries and thirty adult ones in which the arteries had been injected with bismuth, and ten adult tubes and ovaries in which the veins had been thus injected. In the fetal

specimens the arterial supply of the entire fetus was injected. In the adult ones the uterus with appendages were injected, and these specimens were for the most part obtained at operation—a few at postmortem.

Method. The injection mass used was 10 per cent. to 15 per cent. gelatin, which contained in suspension bismuth subcarbonate. The specimen was first submerged in a basin of warm water and the arterial or venous system injected with the melted mass. The injected specimen was placed in cold water until the gelatin had solidified, and afterward preserved in Kaiserling's solution or 10 per cent. formalin.

Stereoscopic radiographs were made for the purpose of studying the course of the individual vessels. Lantern slides made from the stereoscopic negatives and examined in a special stereoscope gave the best results, as the details in a lantern slide are better than those in a print and, furthermore, by transposing the two slides the anteroposterior view is changed into a postero-anterior view and *vice versa*.

In order to compare the blood supply in the different specimens, prints were made from the negatives, some on "Repro" paper and others as bromide enlargements. The course of the vessels were traced with waterproof ink on the prints, using the stereoscope as a guide and taking the liberty to draw vessels to one side, as in dissecting, and to leave out irrelevant branches, the object being to show the vessels desired in one plane so that they would not be confused with each other. The prints on "Repro" paper were then bleached, leaving the tracing in ink. Bromide enlargements separate the individual vessels from each other, and by intensifying the vessels to be studied with ink their course can be followed and compared in different specimens much as in the prints which are bleached. These tracings supplemented with the stereoscope furnished an easy and accurate means of studying the blood supply of the ovary and detecting its variations.

I am indebted to Dr. Tiffany Lawyer for helping me inject the specimens; Dr. J. M. Berry and Dr. William Howard, of the radiographic department of the Albany Hospital for the *x*-ray features of the work; Mr. J. A. Glenn for making the photographs and prints; and Dr. W. M. Baldwin, professor of anatomy in the Albany Medical College for the nomenclature of the arteries.

THE DEVELOPMENT OF THE ACTUAL AND POTENTIAL BLOOD SUPPLY OF THE OVARY. In the study of the arterial supply of the uterus, tubes, and ovaries of a human fetus 26 cm. long, one could follow the course and distribution of the uterine and ovarian arteries, and variations were found in the two sides, and thus variations in the blood supply of the corresponding appendages. Each uterine artery arose from the hypogastric, and on approaching the uterus divided into an ascending branch running along the side of the uterus and a descending one supplying the cervix.

The ascending branch gave rise to the arteriæ uteri propriæ supplying the body of the uterus, and a fundal branch at the uterine cornu, where the uterine artery changed its direction and passed between the layers of the broad ligament to anastomose with the ovarian artery of that side. In its course from the cornu of the uterus to the hilum of the ovary it gave rise to a tubal branch (arteria tabæ intermedia) and terminated in the uteroövarian branch which anastomosed with the ovarian.

The right ovarian artery on approaching the ovary furnished branches to that organ and anastomosed with the ovarian branch of the uterine.

The left ovarian artery on approaching the ovary divided into two branches, a lateral one (tuboövarian) supplying the distal portion of the tube and the distal pole of the ovary, and a mesial one supplying the ovary and anastomosing with the uteroövarian branch of the uterine.

The actual blood supply of the ovary was evident, *i. e.*,

ovarian and uterine. The potential suggested itself in the well-known uteroövarian anastomosis and in the blood supply of the tube.

The blood supply of the right tube was entirely uterine—the arteria tubæ media was derived from the fundal, the arteria tubæ intermedia from the uterine between its fundal and ovarian branch and the arteria tubæ lateralis from the intermedia.

The blood supply of the left tube was partly uterine and partly ovarian. The media and intermedia had origins similar to those of the right tube, but the lateralis arose from the ovarian.

In this divided blood supply of the tube, *i. e.*, both uterine and ovarian, we see the possibilities of the development of a potential blood supply of the ovary by means of establishing a communication between the ovarian and uterine arteries through the arteries of the tube.

In the study of the arterial supply of the uterus, tubes, and ovaries of an older fetus (40 cm. long) a further development of the blood supply of these organs, especially of the arteriæ propriæ was found. The course and distribution of the ovarian arteries was similar to the left ovarian artery in the preceding specimen. The actual blood supply of the ovary was definitely ovarian and uterine, the arteriæ ovarii propriæ arose from the uteroövarian anastomosis. The potential blood supply of the ovary was evident in the free anastomoses of the tubal arteries, thus establishing a communication between the ovarian and uterine arteries hinted at in the preceding specimen. The arteria tubæ media arose from the fundal artery, the intermedia from the uterine between the fundal and the uteroövarian, and the lateralis from the ovarian, and branches from these vessels communicated with each other along the side of the tube and through the lateral branch of the intermedia which supplied the broad ligament.

Fig. 1.—Arterial Supply of Uterus, Tubes, and Ovaries of Fetus 26 cm. long. × 3.

Bromide enlargement of radiograph, arteries injected with bismuth and the course of those to be shown traced with ink, using stereoscope to determine their distribution; organs shaded.

Variations in the distribution of the arteries of the two sides are present.

Each uterine artery arises from the hypogastric. Their course along the sides of the uterus with origin of arteriæ uteri propriæ including fundal branch and the termination of each artery into the ovarian branch, which anastomoses with the ovarian artery, is similar.

The left ovarian artery divides into two branches, a lateral tubo-ovarian supplying the distal pole of the ovary and giving rise to the arteria tubæ lateralis which supplies the distal portion of the tube; the second branch, a continuation of the ovarian, anastomoses with the ovarian branch of the uterine, and from this, arteriæ ovarii propriæ arise.

The right ovarian artery apparently does not divide (the lateral branch not being evident) but unites directly with the ovarian branch of the uterine. This side was not quite as well injected as the right, and small branches may have been missed.

The actual blood supply of the ovary is ovarian and uterine.

The arteria tubæ media of the right side arises from the fundal, the intermedia from the uterine, and the lateralis from the intermedia. The blood supply of the entire right tube is uterine.

The origin of the arteria tubæ media and intermedia of the left side is similar to the right, but the lateralis is of ovarian origin, the blood supply of the left tube is divided, partly uterine and partly ovarian. In this divided blood supply of the tube, uterine and ovarian, we see the possibilities of the development of a communication between the ovarian and uterine arteries through this source.

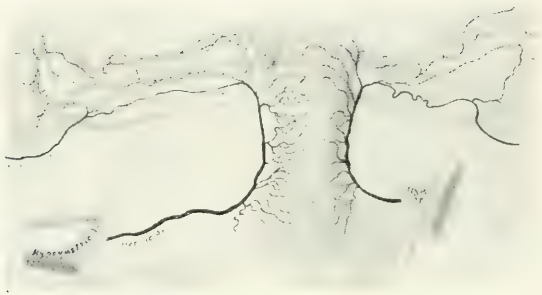

Fig. 2.—Arterial Supply of Uterus, Tubes, and Ovaries of Fetus. 40 cm. long. $\times 1\frac{1}{3}$.

Bromide enlargement as in Fig. 1.

The course and distribution of the uterine and ovarian arteries is similar to the left uterine in Fig. 1.

The actual blood supply of the ovary is as the preceding illustration, ovarian and uterine.

The potential blood supply of the ovary becomes more evident in the further development of the tubal arteries. The mediate arises from the fundal, the intermediate from the uterine, and the lateral from the ovarian, and these anastomose freely with each other. The uterine and ovarian arteries of the same side communicate with each other not only through the well-known uteroövarian anastomosis (uteroövarium communicans) but also through the tubal arteries.

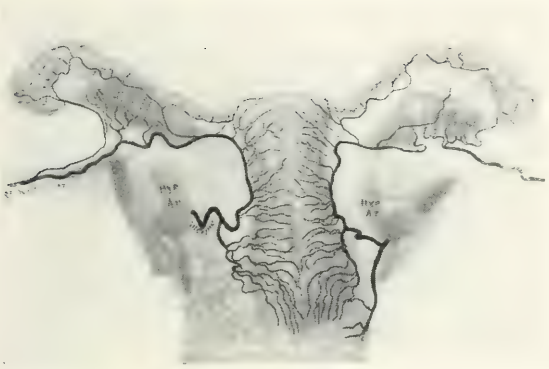

Fig. 3.—Arterial Supply of Uterus, Tubes, and Ovaries of Fetus. 44 cm. long. $\times 1\frac{1}{3}$.

Bromide enlargement as in Figs. 1 and 2.

The course and distribution of the right uterine and ovarian arteries is similar to the ovarian and uterine arteries in Fig. 2. The left uterine and ovarian arteries differ from the right in that the usual uteroövarian anastomosis is not present.

The actual blood supply of the ovaries is similar to the blood supply of the ovaries in Fig. 2, except for the absence of the arteria utero-ovarium communicans on the left side. The origin and distribution of the tubal arteries is similar to those in Fig. 2.

The arteriæ propriæ of the various organs and structures are further developed than in Fig. 2, and in this further development there arises a freer communication between the uterine and ovarian arteries of same side, and thus a better demonstration of their value as a potential blood supply of the ovary.

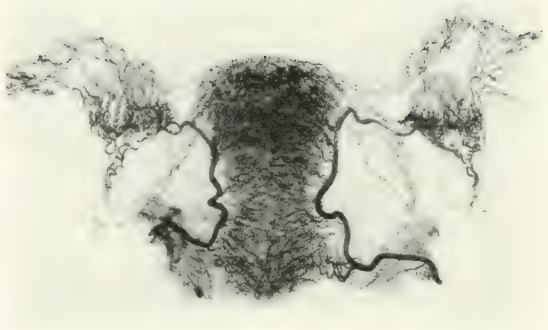

FIG. 4.—Arterial Supply of the Uterus, Tubes, and Ovaries. $\times \frac{1}{3}$.

Radiograph of autopsy specimen; arteries injected with bismuth.

The general course and distribution of the uterine and ovarian arteries is well shown, but it is impossible to determine the exact distribution of these vessels on account of the richness of the arteriæ propriæ of the pelvic organs and the confusion resulting from viewing in one plane vessels which occur in many. See Figs. 5 and 6.

Fig. 5.—Tracing of Arterial Supply of the Left Tube and Ovary Shown in Fig. 4. Most Frequent Type of Distribution of Uterine and Ovarian Arteries Occurring in 24 of 30 specimens. × 1.

Tracing of radiograph in which, under guidance of stereoscope, confusing branches were omitted and others, when necessary, were drawn to one side as in dissecting, so that, as far as possible, all those traced may appear in one plane. The uterine and ovarian arteries were purposely made heavier than in the print, and the arteriæ ovarii propriæ are indicated schematically. The print was then bleached, leaving the tracing.

The branches arising from this portion of the uterine artery are as follows: arteriæ uteri propriæ including fundal branch, branch to round ligament, arteria tubæ intermedia and the terminal ovarian branch, communicating with the ovarian artery.

The branches arising from the ovarian are the tuboövarian supplying the distal portion of the ovary and tube, and the ovario-uterine which with the uteroövarian supplies the proximal portion of the ovary.

The arterial blood supply of the ovary is partly ovarian and partly uterine, the ovarian apparently predominates.

The arteria tubæ media arises from the fundal (uterine), the arteria tubæ intermedia arises from the uterine, and the arteria tubæ lateralis from the tuboövarian branch of the ovarian, which, as already stated, supplies the distal portion of the ovary. The tube also has a divided blood supply, the greater portion being uterine and the distal portion ovarian. These tubal arteries anastomose with each other as also do some of the arteriæ tubæ propriæ.

The blood supply of the broad ligament is partly uterine, especially through the tubal arteries and that of the round ligament, and partly ovarian; branches from these anastomose with each other.

The potential blood supply of the ovary is indicated in the divided blood supply of tube and broad ligament, *i. e.*, uterine and ovarian with communications between the two.

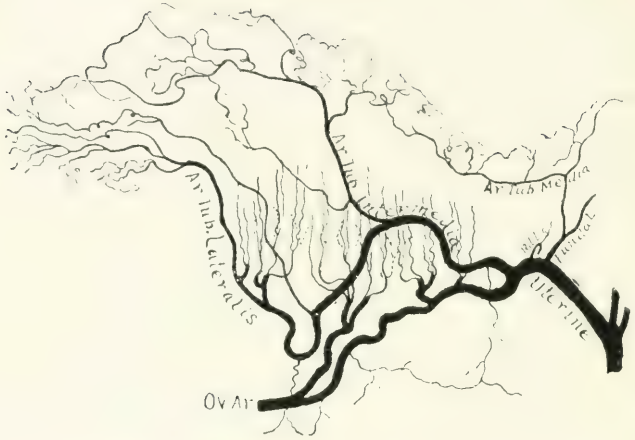

Fig. 6.—Arterial Supply of the Right Tube and Ovary Shown in Fig. 4. Type of Variation in Distribution of Uterine and Ovarian Vessels Occurring in 4 of 30 Specimens. × 1.

Tracing of radiograph as in Fig. 5.

The branches arising from this portion of the uterine artery are similar to the preceding, but their final distribution differs, as will be considered later.

The ovarian differs in its branching from the preceding, the tubal branch being absent. The ovarian divides into two branches, a lateral one supplying the central portion of the ovary and a mesial one which, with the uteroövarian, supplies the proximal portion of the ovary.

The actual blood supply of the ovary is partly ovarian and partly uterine, the uterine apparently predominating; the distal pole is supplied by branches from the arteria tubæ lateralis, the latter a branch of the arteria tubæ intermedia (uterine); the middle portion by the ovarian and the proximal by the uteroövarian, the arteriæ ovarii propriæ arising in groups.

The arteria tubæ media arises from the fundal (uterine), the arteria tubæ intermedia from the uterine, and the arteria tubæ lateralis from the intermedia. The arteria tubæ lateralis takes the place of the tubo-ovarian artery of ovarian origin in the preceding illustration. The blood supply of the tube is entirely uterine, but through the blood supply of the broad ligament branches from the ovarian artery communicate with similar branches from the tubal arteries.

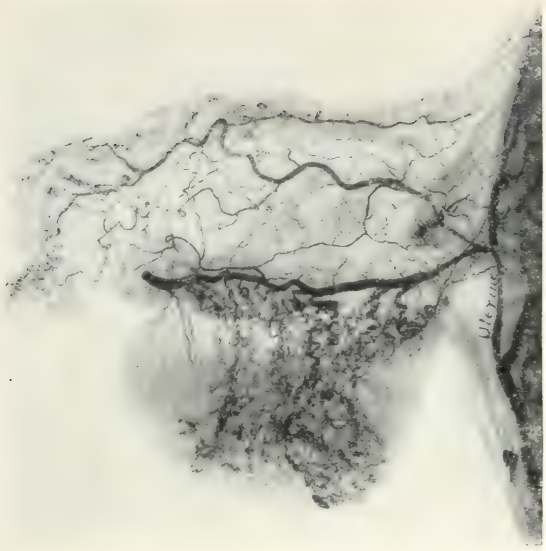

Fig. 7.—Arterial Supply of Adult Tube and Ovary and Broad Ligament, showing another Type of Variation in Distribution of Uterine and Ovarian Arteries and also the Richness of Arterial Supply of Broad Ligament. × 1.

Print of radiograph of operative specimen. The arterial supply of the broad ligament has been traced with ink so that fine branches would not be lost in the reproduction; print not bleached.

The branches arising from the terminal portion of the uterine artery differ slightly from the preceding, the arteriæ uteri propriæ are similar, the arteria tubæ intermedia arises from the uterine much nearer the uterus than in the preceding, the branch to the round ligament arises from the intermedia instead of the uterine, the uterine as usual terminates in the uteroövarian.

The ovarian differs from that in Fig. 5 in the absence of a lateral or distal branch. The ovarian and uterine unite in such a way that it is difficult to detect which is ovarian and which uterine.

The actual blood supply of the ovary is uterine and ovarian, the arteriæ ovarii propriæ arising from the uteroövarian anastomosis in a line instead of groups, as in the preceding specimen.

The arteria tubæ media is insignificant. The intermedia arises from the uterine close to the body of the uterus and the lateralis is a branch of the intermedia, but differs from the lateralis in Fig. 6 in that arteriæ ovarii propriæ do not arise from it. The blood supply of the tube is entirely uterine.

The blood supply of the broad ligament is especially well injected in this specimen. It shows its richness, its origin from many sources, and the free communication between its branches, and thus the importance of the preservation of the broad ligament in conservative ovarian surgery as a source of potential blood supply to the ovary.

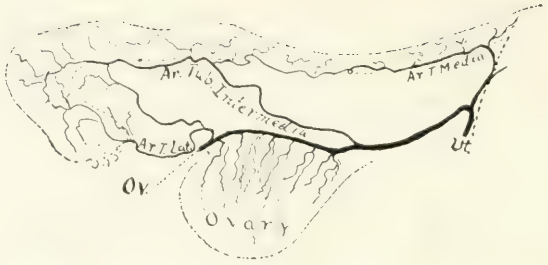

Fig. 8.—Arterial Supply of Tube and Ovary, showing More Frequent Form of Branching of Terminal Portion of Uterine Artery.

Tracing of radiograph of injected specimen subsequently bleached.

In 21 of the 30 specimens the arteria tubæ intermedia arose from the uterine between the fundal branch and the ovarian, as in Figs. 5, 6 and 7, and in the present illustration; in this instance its place of origin is farther from the uterus than in the preceding.

In 24 of the 30 specimens the ovarian divided into a lateral tubal branch and a mesial ovarian; in 11 of these arteriæ ovarii propriæ did not arise from the lateral branch. Compare with Fig. 9.

Fig. 9.—Arterial Supply of Tube and Ovary, showing Less Frequent Form of Branching of Terminal Portion of Uterine Artery.

Tracing of a radiograph subsequently bleached.

In 8 of the 30 specimens the arteria tubæ intermedia arose from the fundal instead of the main uterine artery between the fundal and ovarian branch. Compare with Fig. 8.

In 24 of the 30 specimens the ovarian divided into a lateral tubal branch and a mesial ovarian; in 13 of these the lateral branch was tuboövarian, as arteriæ ovarii propriæ arose from it as in this instance.

In a specimen from a still older fetus (44 cm. long) a further development of the arteriæ propriæ was found and an interesting variation in the blood supply of the left ovary was encountered. (See Fig. 3.)

The course and distribution of the right uterine and right ovarian artery was similar to the preceding. The left uterine and left ovarian differed from the right in that while arteriæ ovarii propriæ arose from them, the anastomosing branch (the arteria uteroövarium communicans) between them was absent.

The distal pole of the right ovary was supplied by the tuboövarian branch and the ovarian and the proximal pole by the ovarian branch of the uterine, the arteria uteroövarium communicans being present. The left ovary had a similar blood supply, but the communicating artery as stated was absent. The blood supply of the tube was similar to that in the preceding specimen.

The potential blood supply of the right ovary is evident in the communicating artery and in the free anastomosis of the tubal arteries.

The absence of the communicating artery between the uterine and ovarian artery on the left side and the communication between the tubal arteries of uterine and ovarian origin emphasizes the importance of the tubal arteries as a potential factor in the blood supply of the ovary.

The still further development of the potential blood supply of the ovary was well shown in the adult specimens. (See Figs. 5, 6, and 7.)

In all the adult specimens the actual blood supply of the ovary was derived from the uterine and ovarian. The ovarian communicated with the uterine, not only through the uteroövarium communicans but also through the vessels of the tube and broad ligament. The tubal arteries anastomosed with each other as in the fetus, the arteriæ tubæ propriæ were further developed and, in places, in the outer

wall of the tube communicated with each other. In twenty-four of the thirty specimens the tube had a divided blood supply, the arteriæ tubæ lateralis arising from the ovarian artery, the remaining branches from the uterine. In the six specimens in which the lateralis was of uterine origin, branches from this vessel anastomosed with branches from the ovarian supplying the broad ligament. The broad ligament received its blood supply from branches of the uterine, ovarian and tubal arteries, and many of these communicated with each other. The pelvic portion of the round ligament received its nutrient vessel from the uterine or one of its branches (see description later), and this also supplied the adjacent portion of the broad ligament. The importance of the tube, broad ligament, round ligament and ovarian ligament as a source of blood supply (potential) to the ovary is evident.

Variations in the Course and Distribution of the Uterine Artery in the Thirty Adult Specimens. The course of the uterine artery along the side of the uterus, with minor variations in the origin of the arteriæ uteri propriæ was similar in all specimens. At a varying distance (from 1 to 2.5 cm. in the hardened specimen) below the tube the uterine artery passed between the layers of the broad ligament toward the hilum of the ovary and terminated in the ovarian branch. Variations were present in this portion of the uterine artery. In twenty-one instances the arteria tubæ intermedia arose from the uterine between the fundal branch and the ovarian branch, more frequently nearer the fundal than the ovarian considering the origin of the ovarian the place where the first arteria ovarii propria arose from the uterine. In eight instances the arteria tubæ intermedia arose from the fundal branch, and in one from an artery (epigastric) in the round ligament, the latter also supplying the fundal branch. (See Blood Supply of Tube.)

The artery to the round ligament sometimes arose from

the uterine between the fundal and intermedia when the latter arose from the uterine, in others from the intermedia or fundal. (See Blood Supply of Round Ligament to be Considered Later.)

The uterine directly or indirectly through its branches supplied a varying portion of the ovary in all, the entire tube in six, the greater portion of the tube in twenty-three, the round ligament and greater portion of the broad ligament in all but one.

Variations in the Course and Distribution of the Ovarian Artery in the Thirty Adult Specimens. In twenty-four specimens the ovarian artery divided into two main branches on approaching the ovary, a lateral tubo-ovarian or tubal branch and a mesial ovarian, the latter anastomosing with the ovarian branch of the uterine. Thirteen of the twenty-four lateral branches were tubo-ovarian—arteriæ ovarii propriæ arising from them. In eleven it was apparently entirely tubal although some of this number, arteriæ ovarii propriæ may have been injured when the uterus was removed at the time of the operation and therefore not detected in the injected specimen.

In six specimens the lateral tubal branch of the ovarian was absent. The ovarian artery directly or indirectly through its branches supplied a varying portion of the ovary in all, the distal portion of the tube in twenty-three and portions of the broad ligament in all, but the latter to a lesser degree than the uterine.

The Actual Blood Supply of the Ovary in the Thirty Specimens. In all it was derived from the ovarian and the uterine artery.

In twenty-one specimens the arteriæ ovarii propriæ (from four to fourteen in number) arose from the utero-ovarian anastomosis (arteria uteroövarium communicans). (See Fig. 7.) Judging by the angle of origin of the arteriæ propriæ from this vessel the part played by the uterine and

ovarian artery in the nourishment of the ovary varied, in some the ovarian predominating, in others the uterine. In all of the above it may be said that the proximal portion of the ovary was supplied by the uterine and the distal by the ovarian.

In five instances the proximal portion of the ovary was definitely supplied by the uterine or uteroövarian and the distal by the ovarian, with the arteria uteroövarium communicans uniting the two. (See Fig. 5.) In none of the adult specimens was the communicating artery absent as shown in the left side of the fetal specimen. (See Fig. 3.)

In four of the six specimens in which the arteria tubæ lateralis arose from the arteria tubæ intermedia (uterine) and not from the ovarian, the arteria tubæ lateralis took the place of the tuboövarian branch of the ovarian, furnishing arteriæ propriæ to the ovary. In these four instances the distal pole of the ovary was supplied by the tubal artery (uterine), the middle portion by the ovarian and the proximal by the uterine or uteroövarium with anastomosis between the ovarian and uterine arteries. (See Figs. 6, 11, 12, and 13.)

In all thirty specimens it can be seen that the arterial supply of the ovary is a divided one, ovarian and uterine, with a balanced communication between the two vessels, not only through the arteria communicans but also through the bloodvessels of the tube (arteriæ tubæ and arteriæ tubæ propriæ) and through the arteries supplying the broad ligament. This balanced blood supply is apparently of value to the nourishment of the ovary in all instances, and especially when there is a marked line of division between the ovarian and uterine blood supply of the ovary, as occurred in nine instances, and most evident when the distal pole of the ovary was supplied by the tubal artery.

The Arterial Supply of the Tube in the Thirty Specimens. The tube was usually supplied by three

arteries—arteria tubæ media, arteria tubæ intermedia, and arteria tubæ lateralis. The arteria tubæ media arose from the fundal branch of the uterine and supplied a varying portion of the isthmus of the tube, its size varied inversely with that of the intermedia; distal branches from it anastomosed with proximal branches of the intermedia and proximal ones with those of arteriæ uteri propriæ. The intermedia, the largest of the three, arose from the uterine at varying points between the side of the uterus and the hilum of the ovary in twenty-two specimens, from the fundal branch in seven, and from an artery in the round ligament (epigastric) in one. It passed diagonally upward and outward between the layers of the broad ligament toward the under surface of the tube, where it divided into two branches, a mesial one going toward the uterus and communicating with a branch of the media—a lateral one passing toward the fimbriated extremity to anastomose with a similar branch from the lateralis. This was the most important tubal artery and varied inversely in size with that of the media and lateralis. Besides nourishing the greater portion of the tube it supplied branches to the broad ligament, frequently gave rise to the round ligament artery, and in four instances supplied the distal pole of the ovary through its lateral branch.

The arteria tubæ lateralis arose from the ovarian artery in twenty-four specimens and the intermedia in six. Next to the intermedia it was the largest tubal artery. It supplied the distal portion of the tube, including the fimbriated extremity and adjoining portion of the broad ligament, and anastomosed freely with branches of the intermedia and ovarian.

Minor variations in the number of tubal arteries were found. In three specimens two intermediate arteries were present, and in one instance two mediate.

The arteriæ tubæ propriæ arose from the tubal arteries

and branches from these anastomosed with each other in the outer wall of the tube.

In twenty-three instances the blood supply of the tube was divided—the greater portion being uterine and the distal portion ovarian. In six instances it was entirely uterine. In one instance epigastric and uterine. In all instances branches of the ovarian communicated with those of the uterine, either through the tubal arteries or when the blood supply of the tube was entirely uterine through the arteries of the broad ligament.

Arterial Supply of the Broad Ligament. This was derived from the uterine and ovarian (one instance partly epigastric through the round ligament). All three tubal arteries contributed branches to the broad ligament, especially the intermedia, branches also arose from the main trunk of the uterine and from the ovarian. The uterine through its branches contributed more to the blood supply of the broad ligament than the ovarian.

The uterine branches supplying the broad ligament communicated with similar branches from the ovarian; this was especially true in the portion of the broad ligament between the hilum of the ovary and the tube.

Through these uteroövarian anastomoses the broad ligament must be considered an important source of potential blood supply of the ovary.

Arterial Supply of the Round Ligament. According to the anatomical text-books the round ligament as it passes through the internal ring receives a branch from the deep epigastric artery.

In most of the specimens the round ligament was clamped close to the uterus in removing the latter; this procedure interfered with the injection of the round ligament from the uterine vessel in these specimens.

In ten specimens I was able to detect the artery to the pelvic portion of the round ligament. In five it arose from

the uterine artery between the fundal branch and the intermediate tubal artery; in three from the intermediate artery and in two from the fundal. Branches from the round ligament artery also supplied the adjacent portions of the broad ligament. This artery accompanies the round ligament towards the internal ring, and I judge must communicate with a branch of the epigastric artery. In one specimen a large artery from the round ligament gave rise to the arteria tubæ intermedia and also supplied the fundal—these two branches from the uterine being absent. This artery was apparently of epigastric origin.

The round ligament must also be considered a source of potential blood supply to the ovary.

Arterial Supply of the Uteroövarian Ligament. Arterial branches pass from the arteriæ ovarii propriæ through this ligament to the uterus and from the uterine artery or its branches to the ovary.

The Potential Blood Supply of the Ovary. The actual blood supply of the ovary is both ovarian and uterine. The blood supply of the broad ligament being both uterine and ovarian, the usual blood supply of the tube being both uterine and ovarian, and as the vessels of the broad ligament communicate with each other and with those of the tube and round ligament, and as the tubal branches communicate with each other; all these structures must be looked upon as containing a potential blood supply to the ovary.

The Venous Outlet of the Ovary. Most of the venæ ovarii propriæ empty into the venous plexus (uteroövarian) situation between the layers of the broad ligament, a few empty into the uterine plexus (along the side of the uterus). The uteroövarian plexus receives venous blood from the fundus uteri, tube, ovary and broad ligament, and is drained by the ovarian veins, the uterine veins (through the uterine plexus), and the epigastric through a vein which accompanies the round ligament.

The course of the venæ ovarii propriæ on leaving the ovarian tissue is partly lateral toward the suspensary ligament of the ovary and partly mesial toward the uterus. A division into an ovarian and uterine outlet is more marked in some instances than in others.

The actual venous outlet of the ovary resembles the arterial supply in being partly ovarian and partly uterine in varying proportions.

The potential venous outlet of the ovary is evident in the various communications between the venous channels of the uteroövarian plexus, the free anastomosis of the veins of the broad ligament and tube, and the communication of the plexus with the epigastric vein of the round ligament.

Changes in the Ovary Due to Interference with its Blood Supply. It is not the purpose of this communication to discuss this phase of the subject, except very briefly. Clinical experience has shown that conservative ovarian surgery is often followed by enlargement of the ovary, due to cystic changes, and edema, and that these changes may cause discomfort and necessitate another operation. This has discouraged many operators in the attempts to save the ovary in salpingectomy and hysterectomy. (For a fuller discussion of this phase of the subject I would refer to the sections on ovarian conservation after salpingectomy and hysterectomy in Norris, *Gonorrhea in Women*, W. B. Saunders Company, 1913, 290 to 300.)

I wish to quote one paragraph from the above, as it has special bearing on this present work: "Clark has shown that the primordial follicles that usually develop in the substance of the ovary reach the surface as the result of two factors, namely, increase in size and the fact that they are pushed to the periphery by the constant pulsation of the ovarian arteries behind them. It would be safe to assume that when the ovarian circulation is impaired, the ovarian arteries pulsate with less force, so that although the maturing

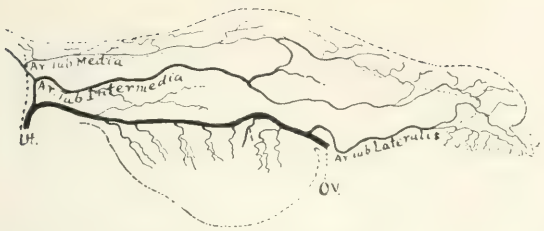

Fig. 10.—Arterial Supply of Tube and Ovary, showing Especially Well the Division of Ovarian Artery into Lateral Tubal and Mesial Ovarian Branch. The Former Entirely Tubal.

Tracing of radiograph subsequently bleached.

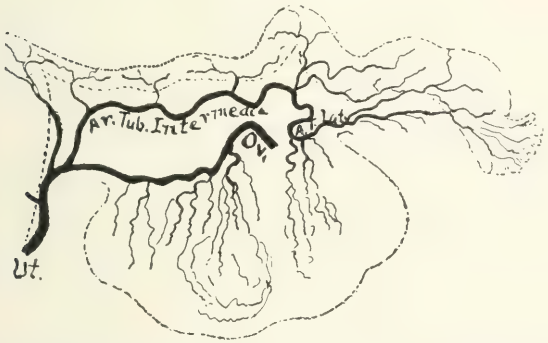

Fig. 11.—Arterial Supply of Tube and Ovary, showing Distal Pole of Ovary Supplied by Lateral Artery of Tube, of Uterine Origin.

Tracing of radiograph—broad ligament vessels purposely omitted—subsequently bleached.

The proximal portion of the ovary is supplied by the uterine, the middle by the ovarian, and the distal by branches from the lateral artery of the tube, which is of uterine instead of ovarian origin; 4 of 30 specimens.

The arteria tubæ intermedia arises from the uterine near the uterus and the arteria tubæ lateralis from the intermedia. The lateralis supplies the distal pole of the ovary. The course of the arteria tubæ intermedia along the tube is such that it would be difficult to avoid injuring it in removing the tube and thus cutting off the actual blood supply to the distal pole of the ovary. This would probably not result in harm if the potential blood supply in the broad ligament was not encroached upon, as through these vessels the ovarian and tubal arteries communicate with each other. For vessels of broad ligament see Fig. 7.

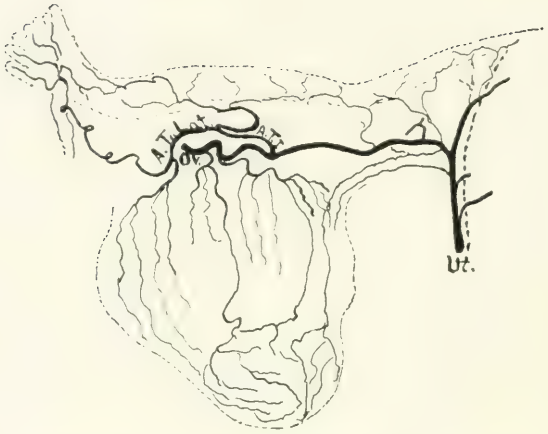

Fig. 12.—Arterial Supply of Tube and Ovary, showing Distal Pole of Ovary Supplied by Lateral Artery of Tube, of Uterine Origin. × 1.

Tracing as in Fig. 11. The proximal and middle portion of the ovary is supplied by branches from the uteroövarian anastomosis, the distal portion through the lateral artery of the tube, which is of uterine instead of ovarian origin.

The arteria tubæ intermedia arises from the uterine near the ovary instead of the uterus as in Fig. 11. The arteria tubæ lateralis arises from it and supplies the distal pole of the ovary.

The course of the arteriæ tubæ intermedia and lateralis is such that if care is taken there is much less danger in injuring the actual blood supply of the distal pole of the ovary in removing the tube than in the specimen shown in Fig. 11.

The tube in this specimen is supplied by five tubal arteries instead of three, there being two supplementary arteriæ tubæ intermediæ near the isthmus of the tube.

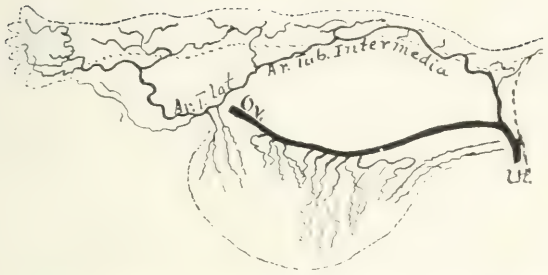

FIG. 13.—Arterial Supply of Tube and Ovary, showing Distal Pole of Ovary Supplied by Lateral Artery of Tube, of Uterine Origin.

Tracing as in previous illustration.

The proximal and middle portion of the ovary is supplied by branches from the uteroövarian anastomosis, the distal portion from the lateral artery of the tube which is of uterine instead of ovarian origin.

The arteria tubæ intermedia arises from the fundal branch of the uterine and the arteria tubæ lateralis arises from the intermedia and from the latter arteriæ ovarii propria to the distal pole of the ovary.

The origin and course of the arteriæ tubæ intermedia is such that it would be impossible to remove the tube without cutting off the actual blood supply to the distal pole of the ovary. It is important to preserve the potential blood supply of the ovary by not removing the tube unless necessary, and if so with the least possible encroachment upon the broad ligament. For bloodvessels of broad ligament see Fig. 7.

Fig. 14.—Venous Outlet of Tube, Ovary, and Broad Ligament.

Tracing of radiograph as in previous illustrations.

The venous outlet of the ovary is a divided one, *i. e.*, partly ovarian through the ovarian veins (*O. V.*) and partly uterine through the uterine plexus of veins (*Ut.*).

The veins of the tube and broad ligament anastomose freely with each other, and are of importance as a potential venous outlet to the ovary if either of the actual outlets is in any way disturbed. In addition a vein (*R*) in the round ligament unites the uteroövarian plexus with the epigastric vein.

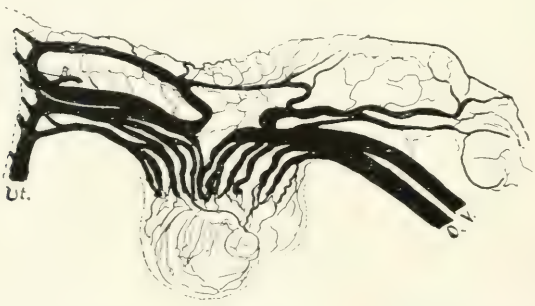

Fig. 15.—Venous Outlet of Tube, Ovary, and Broad Ligament.

Tracing of radiograph as in previous illustration.

The division of the venous of the ovary into an ovarian and uterine outlet is more marked than in the preceding illustration.

follicle might reach the periphery of the ovary, the arteries would not possess sufficient pulsating force to produce a necrosis of the tunica albuginea, lying between the follicle and the surface, which, in the normal ovary, occurs just before the rupture of the follicle. Under such circumstances the follicle, coming in contact with the dense and perhaps thickened tunica albuginea, would fail to rupture and result in a retention cyst. This the author believes to be one of the chief reasons why cystic degeneration follows impairment of the blood supply in this locality. The perioöphoritis which results in thickening of the capsule of the ovary that is often present, and the impairment of the return venous circulation as suggested by Brown, which causes edema are also contributing factors."

The Influence of Salpingectomy on the Blood Supply of the Ovary. We must consider the above in relation to the normal variations in the actual blood supply of the ovary and tube.

Group I. Distal portion of the ovary supplied by the ovarian and proximal by the uterine or uteroövarian, the arteria tubæ lateralis to distal portion of tubal arising from the ovarian, and the arteria uteroövarium communicans present—twenty-four of thirty specimens. (See Fig. 5.)

Group II. The arteria tubæ lateralis arising from the arteria tubæ intermedia (uterine) and not from the ovarian—the distal portion of the ovary being supplied by branches from the arteria tubæ lateralis (uterine), the middle portion from the ovarian and proximal from the uterine or uteroovarium the arteria uteroövarium communicans present. Four of thirty specimens. (See Figs. 6, 11, 12, and 13.)

Group III. Arteria tubæ lateralis arising from the arteria tubæ intermedia but not supplying the ovary, the distal portion of the ovary supplied by ovarian and proximal by uterine—the arteria uteroövarium communicans present—two of thirty specimens. (See Fig. 7.)

In only one instance was the arteria uteroövarium communicans absent and that in a fetus. (See Fig. 3.)

In all salpingectomies the potential blood supply of the ovary is impaired and this impairment is increased the more the broad ligament is encroached upon. The actual blood supply is impaired if the uterine or ovarian artery or branches of same supplying the ovary are occluded or arteriæ ovarii propriæ are injured; the danger of doing this varies with the type.

In Group III there is little danger of injuring the actual blood supply of the ovary if ordinary care is exercised.

In Group I the danger is greater because in freeing the distal portion of the tube it is necessary to ligate the arteria tubæ lateralis and in this group it arises from the ovarian, and, furthermore, arteriæ ovarii propriæ arose from this branch in thirteen of the twenty-four cases. I believe through errors in technic I failed to inject the arteriæ ovarii propria arising from this branch in several instances, and therefore the true number should have been more than thirteen.

In Group II where the arteria tubæ lateralis arises from the uterus and supplies the distal pole of the ovary the dangers of shutting off the actual blood supply to this portion of the ovary are great unless great care is exercised and the tube is removed with the least possible disturbance of the broad ligament.

I do not know of any way of determining the type of arterial supply at the time of operation which would be especially true in pathological conditions of the tube. It is obvious that in removing the tube the surgeon should keep as close to the tube as possible and avoid mass ligatures of the broad ligament. Even with these precautions the blood supply of the distal pole of the ovary would be injured if it was supplied by an arteria tubæ lateralis of intermediate (uterine) origin and the latter from the fundal artery. (See Fig. 13.)

In hysterectomy with conservation of one or both ovaries

the blood supply from the uterine artery is cut off and the supply to the ovary is lessened in all cases and actually shut off from the distal pole of the ovary when the latter is supplied by the uterine (four of thirty specimens), except as it would gain access to this portion of the ovary through the blood-vessels of the broad ligament and tube. The arteria utero-ovarium communicans, when present would supply blood to the proximal portion of the ovary but would not supply the distal pole in the above mentioned group. The communications between the arteries of the tube and broad ligament of uterine and ovarian origin (the potential blood supply) would soon adjust themselves to this change, and the entire ovary would be supplied in all instances if the tube and broad ligament are not removed.

As it is impossible to determine at operation the type of ovarian blood supply present these studies support the practice of not removing the tube or tubes in hysterectomy with conservation of the ovaries. This was advocated by Dickinson in 1911. (See *Surg., Gyn.* and *Obs.*, 1911, xiii, 99; *ibid.*, 1912, xiv, 134 to 136.) I have been following this plan since 1909 and have not encountered any ill effects from not removing the tubes, and my clinical results have encouraged me in the practice of conservation of the ovaries under these conditions.

DISCUSSION

Dr. Robert L. Dickinson.—A detail in vaginal hysterectomy, in line with Dr. Sampson's illuminating pictures, is to save the uterine artery as it runs up the side of the uterus and so safeguard the ovarian circulation. Thus, for the chronic cases of metritis with incurable menorrhagia I have, at times left a narrow strip of the side of the uterus, whipping over and over by the continuous stitch, the description of which I have

published. Later we sew these two edges of the uterus together. Thus the uterine artery remains to nourish the ovary in cases such as those pointed out by Dr. Sampson. This is also feasible in some hysterectomies by the vaginal route for the removal of fibroids, provided the tumors do not invade the broad ligaments. This is slow work but most of the cases are simple, and with ample vaginas such fancy embroidery can be done. Those passages that are not ample, as in virgins, can have the Schuchard incision to widen them. In abdominal hysterectomies for small fibroids or arteriosclerosis the same lateral string of uterus can be left, to sew to its fellow.

Dr. Hugo Ehrenfest.—I should like to ask Dr. Sampson to answer a question. Does in his opinion the blood supply of the ovary as so clearly outlined by him throw any light on the fact that so many of the preserved ovaries later show cyst formations? Does the removal of the tube possibly cause an increased amount of blood to be thrown into the remaining ovary? Or do the ligatures required for the salpingectomy of necessity catch some of the veins carrying blood from the ovary, thus leading to a congestion of the preserved ovary?

Dr. William M. Polk.—I have been very much interested in this demonstration and was hoping to see an additional demonstration in reference to the nerve supply of the tissues it has sought to illustrate. The complete demonstration made by Dr. Sampson of the blood supply has undoubtedly brought him in close connection with the nerve supply, and especially with the sympathetic nervous system, which, centering as it does about the lower portion of the posterior aspect of the cervical uterine region, bear materially upon the nutrition of the entire region, and of course must be more or less injured in any operation done for removal. The elaborations made by Dr. Dickinson in the removal of the uterus either for fibroid or for ordinary diseases, in which he has taken such admirable care for the preservation of the vessels, undoubtedly does a great deal toward the preservation of a large part of the nerve supply; but unless this whole nerve connection is worked out along systematic and thorough lines, which Dr. Sampson has led up to and demonstrated to us here, I rather think that the path along which we still tread will be somewhat obscure.

I hope Dr. Sampson will take up this subject and give it renewed investigation, as I am quite sure he will be able to

elaborate the matter quite as well along these lines as he has done along the arterial and venous supplies.

Dr. John A. Sampson (closing).—In answer to Dr. Ehrenfest's question, I think it is impossible to study the effect on the function of the ovary, of interfering with its blood supply.

Dr. Clark has advanced a theory that the growth of the Graafian follicle toward the surface of the ovary is due to two factors; first, the increase in size of the follicle would naturally cause it to grow toward the cortex, and, second, the pulsation of the ovarian arteries from the hilum toward the cortex would tend to force the Graafian follicle in that direction. If we interfere with the blood supply of the ovary we have a theoretical basis for believing that this may be an important factor in preventing the growth of the follicle towards the cortex and thus causing cystic ovaries. Clinical experience has taught us that in conservative ovarian surgery, cystic ovaries may arise which will subsequently require operative interference.

I undertook these studies primarily for their anatomical interest and they seem to have some surgical importance. In removing a tube we ligate the lateral tuboövarian branch and may actually cut off arteries from that branch which go to the ovary. Interfering with the venous outlet would theoretically cause venous "congestion" and edema. We know that there is a very free communication between the veins of the broad ligament, and if the latter is preserved, together with the tube, I think the venous outlet would not be disturbed.

Dr. Polk asked about the nerves of the pelvic organs. I tried to study them, but I have not been successful. I have been much interested in the blood supply, the lymphatics and nerves of the pelvic organs, but as I was so much more successful in studying the blood supply than the other two I have recently confined my energies to the former.

INCONTINENCE OF URINE IN WOMEN

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and

Charles H. Watt, M.D.
Detroit, Michigan

Definition. In this paper I wish to consider only cases of acquired incontinence of urine in women due to interference with the continuity or the function of the vesical sphincter. Incontinence of urine due to vesicovaginal fistula or to disease of the central nervous system will not be considered at all.

The condition varies from a dribbling with any special exertion such as coughing, laughing, sneezing, at which times a few drops or a considerable amount of urine escapes from the bladder, to a constant wetting with the retention of practically no urine in the bladder.

Incontinence must not be confused with an increased frequency or with urgent urination, though these conditions are closely related and may all be associated in the same case. In cases of frequent urination, there is a frequent desire but there is no wetting if that desire is satisfied. With urgent urination, there may be no increase in frequency, but when the desire to urinate comes, it can be resisted but a short time, hardly time to arrange the clothing. Urgent urination may occur with a normal bladder which is abnormally distended; it may be the result of mental influence, it may be the result of irritability or inflammation of the

bladder. With increased frequency and urgent urination, there is always first a desire for urination, while in incontinence the urine passes without any desire or inclination to urinate. It is well described as a "leaky bladder."

Frequency. The symptom incontinence of urine in some degree will be found frequently if patients are asked direct questions regarding it. Without direct questions, women will speak of the leakage only if the incontinence is sufficiently marked to cause constant wetting. For some years past, both in private and hospital work, we have made a record of a patient's control of the urine a part of our routine history. The degree of this control has been recorded as normal, fair, poor or lost. A "normal" control needs no explanation. A "fair" control is one that is normal excepting at special occasions, such for example, as over distension of the bladder, temporary vesicæ irritability, times of mental or physical fatigue etc. A "poor" control is one that allows the urine to escape on any special abdominal strain such as coughing, laughing, sneezing, or with active exercise such as golf or tennis etc. Such patients are wet most of the time. When the control is "lost" the urine continually dribbles from the patient and practically no urine is retained in the bladder. Obviously this classification is arbitrary and inexact, and one class merges with another.

Table I.—Control.

Children.	Good.	Per cent.	Fair.	Per cent.	Poor.	Per cent.	Lost.	Per cent.	Total.
0–	343	86.2	23	5.7	29	7.2	3	0.9	398
1	190	77.2	18	7.3	33	13.4	5	2.1	246
2	75	71.4	9	8.5	18	17.1	3	3.0	105
3	69	75.0	9	9.8	11	12.0	3	3.2	92
4	38	71.7	1	1.8	10	18.8	4	7.7	53
5	24	72.7	2	6.0	7	21.3	0	0.0	33
6	19	61.4	4	12.7	8	25.9	0	0.0	31
7	15	71.4	0	0.0	4	19.0	2	9.6	21
8	5	50.0	2	20.0	3	30.0	0	0.0	10
9	3	75.0	0	0.0	1	25.0	0	0.0	4
10–11	8	100.0	00	0.0	0	0.0	0	0.0	8
12–14	5	100.0	0	0.0	0	0.0	0	0.0	5
	794		68		124		20		1006

The normal control of urine in women is not as strong as in men, and only the two classes designated as "poor" and "lost" will be considered pathological.

To determine the frequency of disturbance of control of the urine in women, we examined the records of 1006 cases in the gynecological service of the Roosevelt Hospital. The results of this examination are given in Table I. It was found that the control was normal in 79.4 per cent., fair in 6.8 per cent., poor in 12.4 per cent. and lost in 2 per cent. That is, in about 15 per cent. of patients admitted to a gynecological service in a general hospital, the inefficient control of the urine was such that the leakage constituted a disagreeable symptom to the patient.

It was also found as shown in the table, that the percentage of cases in which the control was "poor" or "lost" increased with the number of children which the patients had had, that is, the greater the number of children, the more frequent is the disturbance of the urinary control. The control of the urine was poor or lost in 8 per cent. of the cases with no children, in 14 per cent. of those with one to three children, 24 per cent. of those with four to six children and in 29 per cent. of those with seven to nine children. It is interesting that none of thirteen cases each with more than ten children had any loss of urinary control. The number of these cases, however, is so small that it can be ignored.

The nature of the pelvic lesion for which the patient applied for relief was found, as would be expected, to influence the percentage of cases of abnormal urinary control. Abnormal urinary control was found in 13 per cent. of the inflammatory, 20 per cent. of the fibromyomata, and 45 per cent. of the prolapse cases.

Causes. Incontinence of urine may be the result of lesions

1. Inside the sphincter vesicæ,
2. In the sphincter vesicæ itself,
3. Outside the sphincter vesicæ.

1. Inside the sphincter vesicæ the lesion commonly causing incontinence is an increased irritability of the bladder. This may result from an extension of a pelvic inflammation to the bladder, to a cystitis or trigonitis. The irritability resulting from concentrated urine may produce a temporary incontinence of urine in a woman whose urinary control is ordinarily fair.

2. In the sphincter itself the lesion may be (*a*) an actual destruction of the sphincter muscle from injury or ulceration, (*b*) an overstretching of the sphincter by instruments in examination or the removal of a stone, (*c*) a weakening of the muscle as in advanced age and in prolonged serious illness, (*d*) interference with the nerve supply as in some cases of disease of the central nervous system.

The number of cases of incontinence of urine due to a lesion of the sphincter vesicæ alone is small. Of the cases of abnormal urinary control in the series studies, there was no case of lesion of the sphincter alone.

3. Outside the sphincter vesicæ, incontinence of urine is caused by a displacement of the neck of the bladder and urethra usually associated with a prolapse of the anterior vaginal wall and base of the bladder. It is our idea, based on a theoretical consideration, that the prolapse of the neck of the bladder and posterior urethra does not involve the entire circumference of the urethra but only the lower part, and that the incontinence is caused by the prolapse or dragging of the under part of the neck of the bladder which tends to hold the sphincter open and interferes with its proper action. Anatomically the neck of the bladder and urethra are attached above to the symphysis pubis by comparatively strong bands, below they are closely incorporated with the anterior vaginal wall which is prone to become displaced. Theoretically therefore we would expect only the inferior part of the neck of the bladder to be prolapsed, and would not expect incontinence if the entire neck of the bladder were prolapsed.

This explanation of the pathology of the incontinence of urine in this class of cases is supported by the treatment for its cure. An operation or pessary to remove this drag on the sphincter is usually necessary to cure the incontinence of urine. This class of cases include the largest proportion of all cases.

Treatment. 1. The treatment of incontinence of urine due to lesions inside the sphincter is to relieve the irritability of the bladder. The incontinence of urine in these cases is temporary and is easily corrected.

2. The lesions in the sphincter vesicæ itself which cause urinary incontinence and which require definite treatment are the partial destruction or overstretching of the muscle.

The treatment of incontinence of urine due to actual destruction of the sphincter muscle consists in exposing and reuniting the divided ends of the sphincter muscle. The operation is always difficult and the prognosis is uncertain. A successful case of this kind was reported by Brickner. It may also be necessary to reconstruct the urethra.

The operation which we usually perform for overstretching of the sphincter vesicæ for incontinence of urine is one that is intended to produce an infolding of the sphincter vesicæ and the adjacent parts of the neck of the bladder and urethra. This is accomplished by two or more mattress sutures of fine chromic catgut which include about one-third of the circumference of the urethra. No attempt is made to expose the sphincter muscle itself but the fibrous tissue in its immediate vicinity is included in the sutures.

Some operators determine the exact location of the sphincter vesicæ by passing a self-retaining catheter or bulbous sound into the bladder and withdrawing it until it catches at the sphincter. Instead of following this plan, it has been our custom to place a row of mattress sutures extending three-quarters of an inch, or possibly more, including a part of the neck of the bladder and the first part of the urethra

in addition to the sphincter itself. In this way the sphincter is sure not to be missed, and the infolding of the adjacent parts of the neck of the bladder and the urethra tend to give it additional support.

It is our experience that the number of cases of incontinence of urine requiring operation on the sphincter vesicæ only is comparatively small. In addition to the repair of the sphincter itself, there are usually other lesions of a kind that allows a drag on the sphincter that must also be corrected.

3. In the treatment of incontinence of urine due to lesions outside of the sphincter vesicæ the pessary is of distinct value. The action of the pessary in relieving the incontinence is by producing tension on the anterior vaginal wall and removing the drag on the sphincter vesicæ that interferes with its proper action.

The use of the pessary in the treatment of incontinence of urine is illustrated by the following two cases that have been under our care.

Case I.—Mrs. A., aged fifty-two years, three children, the youngest aged twenty-four years, came complaining of incontinence of urine which had gradually increased in severity until practically no urine was retained in the bladder. There were no other symptoms and a pelvic examination revealed nothing abnormal. The uterus was apparently in its normal position and not increased in size, the tubes and ovaries were normal, there was no apparently relaxation of either the anterior or posterior vaginal walls. A retroversion pessary completely relieved the incontinence of urine. Though it was not apparent by examination it is probable that there was in this case some dropping of the uterus or anterior vaginal wall. The patient later tired of wearing a pessary and had an operation which consisted of a plastic operation on the anterior vaginal wall and urethra and a ventrosuspension. She has since been entirely well.

Case I illustrates the type of case that is cured by the use of a pessary. Some of these cases, especially if advanced in years or are poor surgical risks, would wear the pessary permanently, others would have an operation.

A different result of the use of a pessary is shown in Case II.

Case II.—Mrs. B., aged forty-eight years, one child aged twenty-three years, vaginal hysterectomy for fibroma uteri fifteen years previously by Dr. Cleveland, no other symptoms excepting the incontinence of urine which for several years had been constantly increasing and had reached the stage of constant wetting. This patient was a teacher and her condition was a most uncomfortable one.

A pelvic examination demonstrated the absence of the entire uterus, nothing abnormal in the appendages, and no relaxation of either the anterior or posterior vaginal walls that would ordinarily be considered to require an operation.

A pessary was first used in this case and gave partial but not complete relief. Later a plastic operation was performed on the anterior wall, the sphincter vesicæ and on the pelvic floor which gave partial relief but did not entirely control the leakage. The insertion of a pessary after the operation completely cured the case. That is, neither the use of a pessary or an operation alone was sufficient to cure this case but the two together did.

The treatment of incontinence of urine due to lesions in the pelvis outside of the sphincter vesicæ, is frequently directed to the major lesions only and the sphincter vesicæ neglected. The incontinence of urine may even be entirely overlooked if special questioning regarding it is omitted.

This is wrong. Attention should be directed in these cases to the sphincter vesicæ as well as to the other lesion. As has been shown earlier in this paper, incontinence of urine is frequently associated with those pelvic lesions in which there is a relaxation of the anterior vaginal wall causing a dragging on the sphincter of the bladder, and that this relaxation is

most frequently seen in cases of prolapsus and fibromata of the uterus. Particular attention should therefore be directed to cases having any displacement or enlargement of the uterus or relaxation of the vaginal walls to any inefficiency of the sphincter of the bladder, and if present it should be corrected. The neglect of this precaution means that many cases of incontinence of urine are overlooked and a troublesome symptom is uncured.

If prolapse of the uterus is the associated lesion, the anterior vaginal incision made to correct the cystocele or for an interposition operation should be extended as far as necessary to expose the beginning of the urethra and two or more mattress sutures placed to invert the sphincter vesicæ and the neck of the bladder. If there is no cystocele, the beginning of the urethra should be exposed and the sphincter infolded as in an independent lesion of the sphincter muscle. While incontinence of urine in many cases of prolapse of the uterus will be cured by the ordinary plastic operation, the infolding of the sphincter vesicæ will greatly increase the percentage of cures.

In fibromyomata uteri, the indications are the same. Any drag through the anterior vaginal wall on the sphincter vesical should be corrected, and an infolding of the urethra should be made part of the operation for the treatment of these growths if there is any incontinence of urine.

Conclusions:

1. While incontinence of urine due to a lesion of the sphincter vesicæ only, it is relatively an infrequent symptom.

2. Incontinence of urine due to a lesion of the sphincter vesicæ associated with other pelvic lesions is a frequent and important condition.

3. In pelvic operations for lesions associated with incontinence of urine as a symptom, care should be used to remove all drag or downward traction on the anterior vaginal wall and frequently also to infold the sphincter vesicæ.

DISCUSSION

Dr. Frederick J. Taussig.—In the severe cases of urinary incontinence in which we often have complete destruction of the urethra, I have had occasion to try a rather unusual experiment. In one such instance the patient had been operated on three times previously by prominent surgeons in Philadelphia and Baltimore, and the operative problem was very difficult. There was no sphincter to be found and no urethral wall to make a plastic upon. I therefore thought it might be feasible to utilize the anterior portion of the levator ani muscle from one side, and pulling it underneath the vaginal wall bring it directly under the urethra and then fasten it on both sides to the pubic arch with catgut suture, being careful to preserve the blood supply of the muscle thus transplanted. The operative result, while not perfect, was a great improvement on anything done before, the patient being able to retain from five to six ounces of urine.

Dr. Taylor's recommendation of the use of a pessary coincides with my own experience. In many instances, instead of using a pessary of the ordinary shape, I find I get a better result by eliminating the urethral downward curve and having a certain amount of direct pressure of the pessary upon the urethra.

Dr. Philander A. Harris.—Dr. Taylor in his carefully prepared paper has presented us with a great deal of most valuable detail pertaining to incontinence of urine in women. From a study based on actual clinical histories he has been able to tell us that 20 per cent. of all women have urinary incontinence in less or greater degree.

He further concludes that 2 or 3 per cent. of this class of incontinents are so inconvenienced as to be urgently in need of relief. The gynecologist who has had but a passing interest in incontinence may be inclined to doubt the existence of most pronounced incontinence in one of every two or three hundred women. To me, the figures of Dr. Taylor are not a surprise. The impressions formed from careful history-taking of late years inclines me to value his conclusions regarding the proportion of incontinence.

The ease with which, for a number of years, I have been able to cure, or greatly relieve, almost all cases of urinary incon-

tinence in women, by simple resort to topical applications, has led me to practically abandon operation for the cure of this condition. I might say, parenthetically, that for many years prior to the employment of topical applications, I resorted to operative procedures of various sorts. My successes were then so few, and my failures so many, that I regretted the acquirement of a patient with this complaint. After I began to treat incontinence by topical applications, the cheerful reports of my cases shortly increased my interest in the work, and, by some probable improvement in the technic of application, my interest in the disease has been still further enhanced, so that now I am most glad to have such cases apply for relief.

I am hoping to offer an account of my experience in this relation at our next meeting.

Dr. Herman J. Boldt.—There is only a word or two, in addition to what Dr. Taylor has said, that I wish to add, and it concerns the technic of the exact location of the sphincter. While the mushroom catheter is a very exact method of determining the precise point where the urethra enters the bladder, where we have the vesical sphincter, it is a soft structure, and does not give us exactly what we want, and I have therefore resorted to the following measure: the bladder should be distended and then an ordinary glass catheter used, and at the point where the catheter penetrates through the sphincter, the contents of the bladder come out. We note that point and take an exact measurement to see exactly where the vesical sphincter is located, and having the measurements marked we can cut down and get the sphincter.

As to the sutures, I would say that on one occasion, three years ago, I had an extensive injury of the bladder involving the neck, so that half of the vesical sphincter was destroyed. We found that we were able to get at the first attempt at surgical intervention a complete satisfactory result, but we took a very large bite around the vesical sphincter, not the ordinary small bite, and tied our sutures over a small glass catheter, using two or three sutures. It does not make a particle of difference whether we take the extreme vesical end of the bladder with the sphincter or not; we can take the vesical end near the sphincter and leave a part of the urethra, that is, the nearest part of the urethra to the sphincter. As a rule, my results have been that about one-third of these patients,

which Dr. Taylor has classed under the poor control or no control, are cured.

Dr. Thomas J. Watkins.—My discussion on this subject will be limited to the phase of the subject encountered in the study and treatment of uterine and vesical prolapse. The amount of displacement of the urethra can be determined by pressing the urethra upward in the line of the cervix, and the extent to which the urethra can be so displaced represents the amount of displacement. There are few exceptions to that rule where the upper part of the urethra drops backward and the lower part remains comparatively stationary.

Sutures for prolapse should be placed in the "transposition" operation so that when tied the urethra will be drawn up to a point where it is comparatively fixed, which is normal. In some of the cases operated during the reproductive period loops of the round ligaments have been satisfactorily used for cure of urethrocele. In a few cases the upper part of the cervix or the lower uterine segment has been used for a point of fixation for the urethra. As regards the results, the partial incontinence of urine has been almost invariably relieved. There was one case which I remember where the result was unsatisfactory, where the upper part of the urethra was somewhat dilated and funnel-shaped, and in that case the modification spoken of by Dr. Taylor would probably have resulted in a cure.

Dr. Robert L. Dickinson.—In these cases of incontinence of urine in women, it behooves the gynecologist and cystoscopist to examine every case. In using the Kelly cystoscope one can tell whether there is dilation or spasm of the upper part of the urethra. With a patient in the knee-chest position, with Kelly's cystoscope, a small one, a No. 7 or No. 8, there may be found either a widely gapping upper part of the urethra, which calls for Dr. Taylor's operation, or else there is spasm of the upper part of the urethra. In case of spasm it is wonderful how much the treatment advocated by Dr. Harris will do. The two-way catheter is a simple method for making silver applications to the bladder. With any other means we use the application at a time when there is still urine in the bladder and the silver is precipitated in a useless chloride. If we have an applicator like my "two-way" in which the drops of urine can be drained off through the lower tube while the application

is squeezed into the upper tube we have a relatively dry mucous membrane. I teach intelligent women, particularly those living at a distance, to make self-applications for chronic trouble. Mild applications, frequently repeated every three or four days will cure all of these cases of incontinence which are due to irritations.

Where the element of spasm has occurred we should dilate. Incontinence of urine in women is often the exact equivalent of irritability of the urethra in men. For dilating I have for years been using my new glove stretcher dilator, as yet unpublished. Dilatation with the glove stretcher will relieve many of the spasmodic cases. Its principle is stretching the upper urethra and not the narrow, inelastic sensitive meatus.

Dr. George H. Noble.—I understand that this discussion relates to functional disturbances of the bladder, and I shall confine my remarks to one or two points in the commoner class of cases. In the first place, it is not always an easy matter to locate the exact cause as the etiological factors are so great and so numerous that we have difficulty in deciding positively the particular condition we have to deal with.

The points I wish to refer to are these: In young women, young girls, seventeen and eighteen years of age, we find not infrequently nocturnal incontinence of urine, where the reflex is due to an inflamed hymen. If you snip it out that is the end of the incontinence. Usually I dissect off the urethra back of the suspensory ligament, and cutting off the nerve supply to the meatus will relieve that condition, after which these patients will go three or four hours without having to urinate or they may not have to get up at all at night to urinate as they did before operation. Of course, any abnormal condition of the urine should be corrected.

Not infrequently, young women suffer from urinary incontinence on account of thyroidism, and I have found very frequently that these patients did well under the administration of thyroid extract alone. In older women, in whom there are slight lesions in the pelvis, particularly relaxation, where the urethra rotates under the pubic arch, there may or may not be displacement of the uterus. Relaxation and rotation of the urethra under the pubic arch puts the veins upon a certain amount of tension; the veins do not empty themselves. The nerve supply and nutrition are interferred with; there is a

certain amount of edema, a certain amount of relaxation of the muscle, etc. In such cases, carrying back and anchoring the urethra behind the pubic arch by one of the many methods or by the interposition operation, or anchoring the rectovesical fascia, will enable these patients to empty their bladders. A little belladonna is a fine prescription that our forefathers gave years ago to stimulate sphincteric control. In anchoring the urethra up behind the pubic bone, if you adopt the interposition method, where the uterus is not too large, there is one point of considerable importance, and that is to stitch the fundus directly to the trigonum. You will find, if there is any displacement or relaxation of the ligament, or not much, when you turn the uterus loose, as it goes back it will pull the urethra back into the vagina and correct the rotation outward.

Dr. Gideon Brown Miller.—I have been extremely interested in the subject of incontinence of urine in women. The thesis which I wrote as a candidate for this Society was on this subject. I agree with practically everything the essayist has said. However, there are two or three points I would like to discuss. These have impressed me in my study of this subject and of these cases. In practically all of them, where there was poor control or loss of control, in putting the patient in the knee-chest position and introducing a Kelly cystoscope and slowly withdrawing it, the urethra, as Dr. Dickinson has pointed out, would stand open in a cone-like form behind it. I test my cases in that way to see whether there is loss of sphincteric control. Atmospheric air dilates the bladder and as the cystoscope is withdrawn you see the conical dilatation of the neck of the bladder and posterior part of the urethra.

There is another point that I would like to emphasize. I have had two or three cases of extremely troublesome bladders following the interposition operation. You take a woman with an irritable, chronically inflamed bladder, and disturb its blood supply and normal relations by putting the uterus under the trigonum, so to speak, and you would naturally expect an increase of the symptoms, and in two cases which I have had the symptoms have been markedly increased by the interposition. There is one peculiar thing about some of these cases which I have noticed, namely, at certain seasons of the year incontinence of urine is much more marked than at others. I have a patient who has this extremely troublesome incon-

tinence in the winter-time. In summer it practically disappears. In many of these cases the incontinence is increased during the menstrual periods.

Dr. Howard C. Taylor (closing).—The two points I tried to make in my paper was, one, in addition to drawing up the uterus as spoken of by Dr. Watkins, the advisability of infolding the sphincter. There is no doubt that drawing up the uterus will cure a great percentage of cases. There is no question at all that we can increase that percentage of cures if the sphincter is unfolded at the same time. The other point is the great frequency of imperfect urinary control in women.

X-RAY TREATMENT OF UTERINE HEMORRHAGE

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Introductory. The *x*-ray has been employed in gynecology for a sufficient length of time to allow the profession to form an accurate idea of the merits and demerits of this method of treatment. Nevertheless, the conclusions arrived at vary greatly. Some authors, particularly those of the Freiburg school and many roentgen therapeutists, laud the *x*-ray highly; others, especially certain gynecologists, view the entire question of *x*-ray therapy with suspicion and are inclined to class the method with the numerous transitory fads so common in contemporary medicine.

The present paper aims to defend *x*-ray therapy from its friends. Properly employed, in properly selected cases, the treatment is invaluable and indispensable in gynecology; used promiscuously by the uninitiated, roentgenization is as dangerous as the surgeon's scalpel in the hands of the ignorant and the meddlesome.

The writer has used *x*-ray for a number of years. He has never given the exposures himself, but has always referred the patients to the same roentgenologist. The selection of cases, the general directions (*i. e.*, the effect to be attained, such as toning down of bleeding, amenorrhea, etc.), the control of physical findings have remained in the writer's hands, while technical questions have been left entirely to the judgment of the *x*-ray specialist. No attempt to discuss

the minutæ of technic will be made in this paper. Such information is readily accessible.[1] Burns or other serious disturbances are practically unknown today if treatment is entrusted to competent hands.

Modus Operandi of the Rays. The *x*-rays affect uterine hemorrhage indirectly by their influence upon the ovaries;[2] there is also a certain amount of evidence that uterine fibromyomata are influenced directly.[3]

Ripe and partly ripening follicles are very susceptible to the rays. Primordial follicles, on the other hand, are extremely resistant to even massive and prolonged exposure, the ovaries of young women proving more resistant than those of older females. Whether this increased resistance is due purely to the greater number of primordial follicles in the young is not known.

As the menstrual function is dependent upon ovulation and the subsequent development of the corpus luteum,[4] such uterine hemorrhages as result from normal or abnormal ovarian influences are necessarily affected by the inhibition of follicle ripening and ovulation. If all ova are destroyed, permanent amenorrhea results; if all ripe and ripening follicles are killed, menstruation ceases, until some primordial follicles have had time to ripen and to rupture. Moreover, considerable clinical evidence obtains that certain qualitative changes arise from roentgenization, and persist after cessation of treatment, such as permanent diminution of menstrual bleeding. The physiological changes at the basis of this phenomenon are unknown.

Certain observation showing increase of connective tissue in fibromyomata, which were subjected to raying, have been interpreted as direct *x*-ray effects.[5] Quite possibly, however, the fibrosis is an involution effect due to the withdrawal of ovarian stimuli from the tumors, comparable, though not identical, with the shrinkage of fibroids, usually noted at the physiological menopause.

Technical. *Fractional treatment* implies exposure to the rays for from four to six minutes of one or more large fields in the lower abdomen, two to three times weekly over long periods of time. Such graduated dosage, though slow of effect, usually permits of accurate control of the degree of influence exerted upon the ovaries. It is, therefore, especially recommended for cases where reduction of bleeding and not amenorrhea is desired.

Intensive treatment, according to the improved Freiburg technic, permits of the use of enormous doses at each sitting (small multiple fields, filtration, cross-fire, and lately also the Coolidge tube). By this means amenorrhea may be achieved within a short period of treatment (nine to eighteen weeks). This form of treatment is applicable to cases in which profuse bleeding must be controlled within a short period of time. Graduated effects are less readily obtained.

It is at times indicated to give one or two intensive treatments, to obtain control of the bleeding, and then to continue with fractional doses in order not to produce amenorrhea. An experienced technician can thus produce the desired effects almost at will.

Applicability. X-ray therapy is applicable in:

1. Functional menorrhagia and metrorrhagia of adolescents.
2. Functional menorrhagia and metrorrhagia during sexual maturity.
3. Functional menorrhagia and metrorrhagia preceding the climacterium.
4. Menorrhagia and metrorrhagia due to fibromyomata.

1. Adolescent Hemorrhages. Prolonged and irregular hemorrhages between the ages of thirteen and eighteen years are not uncommon. The majority of cases respond to general tonic treatment, uterine styptics (ergot, styptol), and hygienic measures. A small number require one or more curettages. A still smaller number, in whom the preceding measures fail to cure, are relieved by serum injec-

tions, calcium chloride by mouth or rectum, or transfusion. The few remaining cases, usually quite desperate, because of their extreme anemia and debility, after all measures have been tried in vain, are saved from hysterectomy or oöphorectomy by *x*-ray treatment. One or two intensive treatments are followed by fractional exposures until complete amenorrhea is obtained. This effect is usually not attained for several months, during which the bleeding occurs less and less frequently and in diminishing quantities. If vasomotor symptoms (flushes) develop the exposures should at once be diminished, as the dosage has been sufficient to produce amenorrhea within a short time.

The amenorrhea may persist for from eight to twelve months; then scant and irregular (every three to six months) periods appear; finally normal menstruation is reëstablished. Permanent amenorrhea is almost impossible to obtain in very young women.

2. Functional Menorrhagia and Metrorrhagia during Sexual Maturity. Occasionally cases are encountered in which purely functional hemorrhages necessitate interference. The patients usually are in the early thirties and have had one or more children. The bleeding may take the form of either menorrhagia or metrorrhagia, or both. Inflammation can be excluded both by the history (absence of venereal infection, normal puerperiums, etc.), and by the physical findings. Usually the sole change noted is a moderate symmetrical increase in size of the entire uterus. Repeated curettages either produce only temporary palliation or are of no avail. The curettings regularly show "endometrial hyperplasia" or "cystic endometrial changes." Formerly such cases, after palliative measure had failed, were treated by atmocausis or hysterectomy. Some of these patients desire more offsprings.

When the condition is clear, *i. e.*, absence of inflammatory lesions, curettings showing absence of carcinoma, *x*-ray

treatment is applicable. If no more children are wanted, amenorrhea may be induced, otherwise the bleeding should be "toned down" by fractional dosage; the more advanced the age of the patient the less exposures are needed. When the periods occur only at two to four months' intervals and are scanty it is well to temporarily stop treatment in order not to run the risk of producing the menopause. Such patients may later conceive and bear healthy children.

3. Functional Preclimacteric Menorrhagia and Metrorrhagia. In these cases carcinoma must always be excluded by one or more curettages (microscopic control). The curettings ordinarily resemble those obtained in Class 2. Unless the adnexal regions are free, *x*-raying is also contraindicated. Many of the cases clinically fall into the group of so-called "fibrosis uteri," "myopathies," "metritis," etc.

Other things being equal the patient should be given the choice between operation and *x*-ray. In cases in which vaginal hysterectomy promises to prove technically easy, operation should be preferred; on the other hand, in obese, emphysematous patients, or those appearing to be poor operative risks, roentgen treatment is to be recommended as less dangerous than operation.

A few intensive treatments regularly produce permanent amenorrhea. If this outcome is not obtained a mistake in diagnosis has been made (carcinoma, pedunculated submucous fibroid).

4. Menorrhagia and Metrorrhagia due to Fibromyomata. This class of cases has given rise to the largest amount of discussion. Kroenig and Gauss[6] claimed 100 per cent. of cures where the method was used and an applicability of 85 per cent. The writer, on the other hand, finds an applicability of only 5 per cent. in his material.[7] Between these widely divergent views all manner of opinions are noted.

To form a correct opinion a number of factors must be

taken into consideration. The discovery of a symptomless fibroid *per se* does not indicate any interference. In the writer's experience only 45 per cent. of fibroids require treatment, especially if the patient is not informed of the presence of a "tumor." Some member of the family may be made aware of the condition, in order to safeguard the physician.

Unless fibroids produce menorrhagia and metrorrhagia, pressure symptoms or enlargement of the abdomen, their presence is rarely noted and operation not considered.

Bleeding is the symptom most often complained of and most readily relieved by raying. Before *x*-ray treatment can be considered, carcinoma must be excluded by exploratory curettage. The absence of cancer can be demonstrated only if the entire endometrial cavity is accessible to the curette. Uteri which contain tortuous cavities (submucous fibroids) ought, therefore, not be rayed.

Where pressure symptoms are severe, or where large tumors are noted, the writer excludes the use of the rays, because several months of treatment must elapse before considerable reduction in size of the mass and consequent relief can be looked for.

Kroenig and Gauss consider the following conditions contraindicating *x*-ray treatment:

1. Pedunculated submucous fibroid partly extruded from the cervix.
2. Gangrenous or suppurating fibroids.
3. Combination of fibroid and endometrial carcinoma.
4. Fibroids in which rapid growth, profuse metrorrhagia and unsuccessful roentgen treatment makes the fear of sarcomatous degeneration likely.
5. Fibroids causing acute incarceration of the bladder.

Besides this they rarely recommend radiotherapy for patients below the age of thirty-five years, as permanent amenorrhea is difficult to obtain.

These contraindications are not sufficiently rigid. Abdominal diagnosis, including gynecological diagnosis, is notoriously uncertain. Surprises are constantly encountered. Even the experienced clinician will occasionally "slip up" on an apparently simple diagnosis, mistaking, for instance, a cyst for a fibroid. In order to protect the patient it is necessary to exclude all doubtful and complicated cases. What constitutes a doubtful or a complicated case remains a matter for the judgment and experience of the gynecologist to decide. The writer in a series of 419 unselected cases, which were admitted for operation to Dr. Brettauer's service at Mt. Sinai Hospital, found 140 complicated cases (35 per cent.), as Table I will show:

TABLE I

Malignancy			15
Carcinoma	of uterus	2	
	of gut	1	
Sarcoma	of uterus	5	
	of esentery	1	
Ovarian papillomatous cysts		6	
Proliferating Ovarian Growths (Non-malignant)			18
Dermoid cysts		3	
Non-malignant cysts		15	
Adnexal Diseases (serious)			13
Tubo-ovarian abscess		4	
Tubucular salpingitis		3	
Pyosalpinx		6	
Uterine Conditions			13
Necrotic and gangrenous fibroids (hysterectomy)		5	
Necrotic and gengrenous fibroids (myomectomy)		7	
Tubercular endometritis		1	
Pregnancy			15
Hysterectomy necessary		9	
Myomectomy necessary		2	(gravidity continued)
Curettage		2	
Exploratory		2	(gravidity continued)
Not operated		4	
Complications absolutely contraindicating rays			74
Less serious complications			
Hydrosalpinx		7	
Chronic diseased adnexa		52	
Cystic ovaries		34	
Complications not absolutely contraindicating rays			66
Total complications			140 (35.00 per cent.)
Contraindication to rays			74 (18.50 per cent.)

Of the 140 cases, at least 74 (18.5 per cent.) presented conditions absolutely contraindicating raying. Many of these conditions were not, and could never be, diagnosed before operation.

Absolute contraindication to *x*-ray treatments in the writer's opinion is present if carcinoma or sarcoma are found or suspected; if ovarian cysts or tumors are felt, if the uterine tumor is rapidly growing, if the tumor is large (size of a five to six months' pregnancy), if the palpatory findings are doubtful (suspicions of adnexal trouble, of rectal or sigmoid tumor, of adhesions, etc.).

Pedunculated or degenerating tumors, when recognizable, are also contraindications. Urgent symptoms will necessarily preclude the use of the rays.

In clear cases of uncomplicated fibromyomata not excessive in size, but causing symptoms, the question of raying versus operation may be considered. The decision rests with the patient, who should be enlightened in regard to the risk of operation (mortality 0.5 to 2 per cent.),* on the one hand, contrasted with the duration and expense of *x*-ray treatment on the other.

Social Considerations. X-ray treatment can be given to the impecunious only in well-equipped and well-endowed institutions. In addition to the initial expense of the installation, the operator's time, the electricity consumed, and the replacement of tubes, etc., produce a formidable expense account. Fractional exposures (four to six minutes) cost approximately $3 each to cover expenses, and may have to be continued two to three times a week for many months. Intensive exposure, sufficient to produce amenorrhea and shrinkage of a fibroid in a woman thirty-five years of age, will cost from $100 to $300 at a minimum.

* In 400 operations 7 patients died. In 4 of these the rays could not have been used (sarcoma of uterus and papilloma of ovary; fibroid and pregnancy with Basedow; necrotic fibroid extruding from cervix; sepsis; fibroid incarcerating bladder; vesical resection).

Indications. Taking into consideration the absolute contraindications, the dangers of operation, the expense and time involved, the writer believes that about 5 per cent. of fibroids (*i. e.*, 10 per cent. of those requiring interference) should be treated with the *x*-ray. These indications are met in uncomplicated cases in which

1. Operation is declined.

2. Operation is contraindicated because of extreme nervousness or psychical unrest.

3. Operation is inadvisable because of serious heart, renal or pulmonary lesions.

Summary. 1. The roentgen ray produces amenorrhea by destroying the ovarian follicular apparatus, or oligorrhea by partial destruction of follicles. The resulting menopause symptoms correspond in character and degree to those of the post-operative menopause.

2. The choice lies between two methods of application: (*a*) the fractional weak, requiring prolonged use, but readily controllable; (*b*) the intensive-massive, more rapidly producing amenorrhea.

3. Obstinate cases of hemorrhage in adolescents can be cured. Only such cases as have resisted all other forms of therapy should be selected.

4. Functional hemorrhages during sexual maturity, if conditions are unmistakable, and curettage shows absence of carcinoma, may be relieved by producing oligorrhea (with the possibility of subsequent pregnancy) or definitely cured by inducing the artificial menopause.

5. Preclimacteric functional hemorrhages are readily cured by the production of the menopause. At this age, malignancy must be even more carefully guarded against.

6. Uterine fibroids may be slowly reduced by *x*-ray treatment. All complicated cases should be excluded, as otherwise serious or fatal mistakes may occur. In properly selected cases (5 to 10 per cent.) the choice between operation

and roentgen therapy may be left to the patient. In patients with serious heart lesions, nephritis or pulmonary trouble, or in the hyperneurotic, preference should be given to the *x*-rays.

Conclusions. X-ray in gynecology has proved an invaluable addition to our armamentarium. It enables the gynecologist to exert graded effects upon the ovary, and thus control the menstrual cycle in degrees varying from slight inhibition to permanent destruction of function. It also causes fibroid tumors to diminish in size or to disappear.

The main danger to be apprehended in *x*-ray treatment is their application by error to malignant tumors. Such danger is minimized by excluding cases which present doubtful or complicated findings. Hence, the treatment must always be controlled by the trained gynecologist, because diagnostic accuracy is far more essential than if operative measures are contemplated.

Bibliography

1. Stern, S. Am. Jour. Obst., 1915, lxxii, 396.
2. Fellner, O., and Neumann F. Zentralbl. f. Gynäk., 1906, xxx, 630.
3. Meyer, R. Zentralbl. f. Gynäk., 1912, xxxvi, 529.
4. Frank, R. T. Surg., Gyn. and Obst., November, 1914, xix, 618.
5. Frank, R. T. New York Med. Jour., March 30, 1912.
6. Kroenig. Am. Jour. Obst., 1914, lxix, 205.
7. Frank, R. T. Am. Jour. Obst., 1915, lxxii, 408.

PRECANCEROUS CHANGES IN THE UTERUS

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The failure of scientific medicine to discover either a cause or a cure for cancer does not deny an assurance of a promising field in a more definite investigation of the local physiological and pathological changes which relate to the inception of the disease in individual organs.

Numerous conditions are recognized clinically as preceding or associated with cancer of the uterus in a variable percentage of cases. Trauma of the cervix during parturition, resulting in a variable amount of ectropion, is generally regarded as an important factor in the etiology of cancer of the uterine neck, but its histogenetic significance—whether related to the presence of scar tissue, to regenerative hypertrophy, or in furnishing a larger field for atypical strife between two kinds of epithelium—is far from established. Chronic inflammatory diseases are becoming more definitely recognized as antecedents of neoplastic growth in the uterus, as well as in the breast and other organs.

Polese,[1] for example, states that an endocervicitis preceded cancer of the cervix in 34 of his 48 cases, and we find in the records of numerous observers how often such changes are related to the history of gonorrhea, less often to that of tuberculosis. Syphilis is more definitely related to the inception of a cancerous disease in some regions of the body than any other common disease. In the uterus its relation is less

well defined, but with our present resources in diagnosis a promising field for pathological research appears to be furnished in a closer study of those lesions designated as leukoplakia. Ewing[2] states that the cervical erosion is the most definitely established lesion known to precede cervical cancer, and for corpus carcinoma, he says, the chief definite etiological factor is the association with myoma. Evidence of this frequent association of myoma with cancer of the uterus is furnished by numerous writers. Taussig[3] states that in a personal communication from the Mayo Clinic he learned that myomata were present in 10 out of 40 cases of cancer of the corpus uteri in that clinic.

The observation of such causal relations, however important they may be in the study of the occurrence of uterine cancer, does not include its formal histogenesis, the study of which becomes necessary in order to define the term "precancerous."

Clinicians are generally agreed that there are no pathognomonic symptoms of uterine cancer until the tumor growth has become well established, and usually not until its destructive capacity is grossly manifested. Atypical bleeding or discharge, combined with other symptoms and a careful physical examination, can only create a weak or strong suspicion of its early existence without the aid of a competent histological examination, from which it is universally expected that a positive confirmation or denial of the clinical suspicions will be made. Failure to receive a positive diagnosis often creates in the mind of the clinician a suspicion of the incompetency of the pathologist, or in the mind of the pathologist that he has not been furnished with the proper material. Each of these conditions may maintain, but an analysis of the histological criteria upon which a positive diagnosis of a fully established cancerous growth is made shows that the pathologist, like the clinician, is ordinarily not prepared to make such a diagnosis until some amount of destructive

capacity is histologically manifested. In other words, cancer is an evolutionary process requiring time to show its actively destructive purpose. Ewing[2] says, "It is not true that a pathological condition must be either cancer or not cancer. It may be neither the one nor the other. It may be in the process of becoming cancer." Using this author's analysis of the histological criteria in the diagnosis of cancer, we have: "(1) Cellular overgrowth passing beyond that observed in other processes affecting the same tissue; (2) atypical qualities of the cells, metaplasia, anaplasia; (3) loss of polarity; (4) heterotopia; (5) desmoplastic properties; (6) local invasive properties; (7) metastases." Before there is an appreciable amount of heterotopia or invasive features, however, innumerable combinations of criteria may be seen, each varying in quantity and quality. In some cases the amount of proliferation will make a striking feature; in others the atypical quality of the cells—their size, irregular shape, peculiar staining qualities, especially the larger size and hyperchromatism of their nuclei, or their loss of polarity—will present such pictures that one feels reasonably certain that a malignant growth is in a developing stage. To many of such areas the term "precancerous" seems to be appropriately applied.

In the literature of uterine cancer we find much to support the idea that the evolution of a malignant growth can be observed from its beginning in definitely benign lesions to a stage in which it becomes a fully developed neoplasm. Schottlaender and Kermauner,[4] in their extensive monograph, express the evolutionary character of cancer in the use of the terms, immature, moderately mature and fully mature, according to the number and kind of morphological features that they present, without regard to their histological type, size, or age. Contrary to the opinion of the majority of pathologists they believe that, although there is no specific criterion by which the earliest beginnings of cancer-cells

can be recognized, it is possible to recognize an immature stage of cancer before its destructive growth is shown, especially in the squamous cell form, most of which appear in this stage. To those cases in which the morphology appears doubtful they use the term "precancerous." While other writers are not so frank in the use of this term, there is much evidence in their discussion of atypical changes of benign lesions in the uterus and their relation to the development of malignant growths to justify its application to a definite variety of intermediary changes.

Metaplasia. The transformation of cylindrical epithelium into the stratified variety has been produced experimentally in the stomach of lower animals by Fuetterer[5] and Possner,[6] and metaplasia of epithelium in the gall-bladder, stomach, urethra and other organs has become established as a definite factor in the development of squamous-cell carcinoma in these organs. The uterus offers an especially fertile field for the study of the significance of this change in the evolution of malignant neoplasms. A certain amount of epithelial change and proliferation is shown by Klein,[7] Mueller,[8] and others to occur as a result of the physiological functions of menstruation and pregnancy, and the factor of atrophic changes of the surface epithelium after the climacteric in the production of epidermization is discussed by Moericke[9]. R. Meyer,[10] in finding islands of stratified epithelium in the surface epithelium of the uterine body of a newborn infant, and in subsequent observations, has contributed much to the factor of developmental error. Friedlaender[11] observed small islands of stratified epithelium both on the surface and dipping in a few places into the glands of the lower segment of the uterine body of a child of five, which he ascribed to hemorrhagic effusions and exfoliation of particles of mucosa during a severe scarlatinal nephritis. The potential frequency of metaplastic change in the uterine mucosa is discussed by Werth[12] in the regenerative changes following

curettage. Its frequency, as presented by Zeller,[13] in every form of chronic endometritis is questioned by subsequent writers, but its occurrence in long existing chronic inflammation, due to gonorrhea, tuberculosis and, perhaps, to syphilis, is amply attested by numerous observers (Gebhard,[14] von Franque,[15] Ruge,[16] Hengge,[17] Oeri,[18] Kaufmann,[19] Sitzenfrey,[20] Schauenstein.[21] Hitschmann[22]) for an explanation of this process in the uterus, offers the view that under pathological conditions the uterine epithelium may acquire the old embryonic capacity of that of the Mueller duct to form indifferently either cylindrical or stratified squamous epithelium in any part of its course, and believes that, exclusive of polypi and other benign tumors, its presence in the form of a true epidermization does not occur except as a malignant process. As a histological criterion in the diagnosis of neoplastic changes its importance is related to its diversity of form and extent in those lesions under discussion.

Cervical Erosion. The strongest argument against the histogenesis of carcinoma from this lesion has been the apparent infrequency which cancer has been observed clinically to follow such a common lesion. The best clinical record of such a sequence is that of Beckmann,[23] who, in a case, aged thirty-seven years, that he had treated for an erosion over a period of five years, finally saw a squamous cell carcinoma develop. In another, aged forty-three years, after two years' duration of a lesion diagnosed as ectropion, an excision was made, one and one-half years after which a carcinoma appeared. Several factors suggest themselves as contributing to the infrequency of such observations: (1) The failure of the patient to consult a competent clinician before the tumor is well established; (2) the length of time that such benign lesions probably exist before atypical changes begin preclude the continuous observation by a single clinician; (3) the frequent cure of such lesions by minor

surgical procedures; (4) the orthodox conception of the pathologist that no intermediary stages can be recognized morphologically between benign and neoplastic change. The evidence, however, in pathological literature has become sufficient to direct our attention to a closer study of the atypical changes which frequently occur in the course of healing of cervical erosions. Ruge and Veit[16] long ago expressed the opinion that erosions are not always a simple and unimportant process, and that an isolated erosion gland cannot always be differentiated from an isolated carcinoma gland without the surrounding tissues. Amann[24] refers to a number of cases in which the newly formed epithelium in a healing erosion spreads like a portio epithelioma. Winter[25] states that a true portio epithelioma not rarely forms from a healing erosion. Koblanck[26] can only express the differential character of a healing erosion and a portio carcinoma in the greater or less amount and regularity of epithelial metaplasia, and the more or less atypical qualities of the cells. Alfieri[27] has traced a carcinoma of the vaginal vault to a follicular erosion gland in a case of endocervicitis. Von Franque,[15] in a case, aged forty-three years, found typical carcinomatous epithelium in the glands of a follicular erosion which he regarded as suspicious. Rubin[28] has recorded 3 cases of undoubted incipient cancer arising in a definite proliferation of atypical epithelium on the surface and in the glands of healing erosions, in which the diagnosis was made: (1) from indistinct definition of cell outline, especially in the deeper layers; (2) from the irregular, large, hyperchromatic nuclei, occasionally lumped together; (3) no definite stratification of the layers and lack of alignment of the basal cells; (4) marked nuclear granulation, as seen frequently in carcinoma in which hornification has not appeared. Mitoses and hornification, he regards, as variable qualities. Schauenstein[21] gives a comprehensive description of the evolutionary features of cancer of the cervix in a report of 4 cases. His first case,

presenting an atypical proliferation of epithelium cells in a circumscribed area of the portio and along the lower part of the cervical canal, differed quantitatively from a healing erosion in the amount of cell proliferation along the surface and the extent to which the glands were filled with stratified epithelium, and, qualitively, in the atypical character of the cells, in their loss of polarity in the deeper layers, and the presence of numerous atypical mitoses. The other 3 cases, which appear to be definitely established carcinomata, differed from the first case in the amount of their atypical qualities and in the distinct heterotopia and slight stroma invasion. No macroscopic growth was found in any of the cases, but in the three fully established growths it extended superficially along the entire cervical canal in one, to the lower part of the corpus mucosa in another, and to the corpus and vaginal wall in the third, the vaginal epithelium being preserved over the growth. The morphology of the cells in the first case differed slightly more from those seen in atypical healing erosions than it did from the other 3 cases, the latter differing from each other chiefly in the amount of definition of cell outline. Under a high power the differentiation between the cells of the first and other cases, he says, could not be made. Schottlaender and Kermauner[4] made a similar observation regarding the differential morphology of such cases. In other words, Schauenstein made the diagnosis of a definitely established cancer in 3 of his cases by a destructive action, manifested by a distinct heterotopia and invasion of the glands not only by a direct proliferation through their mouths but also by bursting through their walls with which they came in contact. He believes that the first case was becoming a similar growth and only needed time to show its destructive action. K. Ulesko-Stroganowa,[29] in a report of 3 cases describes the histological features of developing carcinomata on the base of healing erosions, but her drawings do not confirm the descriptions, and the rapid

regression of the processes that she was able to demonstrate by an examination of the uteri, which were removed four weeks later in 2 cases, and of the cervix which was amputated two weeks later in the other, makes it seem probable that in these cases there was only an exaggerated amount of cellular proliferation in the process of a healing erosion in 2 of the cases and a gonorrheal infection in the other. They show, however, the evolutionary character of the process. Cullen,[30] to whom we are much indebted for his analysis of the histological criteria in the diagnosis of uterine cancer, shows pictures of sections in the neighborhood of fully established tumors, which he regards, if taken by themselves, as suspicious.* If no other evidence of growth existed, how shall such changes be interpreted, except as representing the developing stage of cancer?

Leukoplakia. The potential elements in these lesions of the tongue to develop cancer has long been recognized. Weir,[31] 1875, was the first to describe leukoplakia of the female genitalia in the report of 2 cases occurring upon the vulva, both of which developed cancer. Since then a few writers have described their occurrence on the vagina, portio, cervical and uterine canal, which in most instances after a long time, have developed into cancer. Von Franque[15] made the first clinical observation of leukoplakia of the portio developing into a carcinoma, observing the case as beginning in an erosion. His second case observed over a period of six years, finally became a carcinoma. Berkeley and Bonney[32] consider leukoplakia of the vulva as the first stage of cancer. Sweeney[33] reports a case, aged thirty-three years, giving a history of syphilis and a positive Wassermann. It was also associated with a gonorrheal pyosalpinx. No improvement followed the use of salvarsan and six months later a hysterectomy was done. Nothing of importance has been written

* Pages 57, 290, 293.

regarding the etiology of these lesions in this region or their relation to syphilis, except that in a few instances there has been a history of syphilis. So few cases of uterine leukoplakia have been recorded that it must be considered clinically a rare disease. It has appeared in the cases so far reported on the portio in association with similar and usually more extensive areas upon the vaginal walls, or extending along the cervical and uterine canal to the fundus. The lesion appears as yellowish white, slightly elevated patches of different sizes, discrete or joined to each other by narrow bridges. The patches are adherent to the underlying tissue, which bleeds if they are wiped away (von Franque, Sweeney). It has been described in a more extensive and diffuse form under the name of psoriasis or ichthyosis by von Rosthorn,[34] von Franque,[15] Zeller,[13] and others. Its pathology, as given by d'Hotman de Villiers and Thérèse,[35] Jayle and Bender,[36] von Rosthorn,[34] and von Franque,[15] consists of a marked metaplasia and thickening of the horny layer, with increase in the keratohyaline granules of the stratum granulosum (Sweeney[33]), resulting in complete epidermization, and often showing considerable epithelial downgrowth. The more extensive growths which have existed a long time may present the picture of an adult acanthoma, as, for example, the case of von Rosthorn,[34] which is so regarded by Hitschmann[22] and others. This epidermization of the uterine mucosa relates specifically to the histogenesis of a number of recorded cases of carcinoma, in which an extensive but superficial spread of the growth has occurred, covering a greater part of the mucosa of both the corpus and cervix (von Pierung,[37] Ruge and Veit,[16] Benckiser,[38] Hofmeier,[39] Gebhard,[14] Gellhorn,[40] Kaufmann,[19] Schauenstein.[21] Some of these cases have shown acanthoma in the corpus and adenoacanthoma in the cervix, or focal areas of acanthoma in an adenocarcinomatous structure, for which an explanation may be reasonably found in the preëxistence of leukoplakia.

Pfannenstiel[41] says every case of epidermization is not suspicious, but it is a precancerous stage in the same way that glandular hypertrophy and hyperplasia is to adenoma and adenocarcinoma.

Uterine Polypi. Numerous writers have directed attention to the frequency of sufficiently atypical epithelial metaplasia and overgrowth in uterine polypi (Klob,[42] Billroth,[43] Amann,[24] Keitler,[44] Winter,[25] Kroemer,[45] Bulius,[46] Kuestner,[47] Gessner[48]) to furnish evidence of their malignant tendency. Oeri's[18] description and drawings of the changes in both the surface and gland epithelium justify his conclusion that, although a diagnosis of a fully established neoplasm cannot be made, they contain the potential elements of a developing cancer. He also reviews the literature of similar cases. J. Williams[49] describes a mucous polyp in which the downgrowth of epithelium into the glands is atypical enough to create the impression of a developing malignant growth. Opitz[50] directs attention to the frequency of epithelial metaplasia over that part of the polyp projecting into the vagina, in which he sees a base for the development of a malignant change.

Submucous Fibromyomata. The importance of these tumors in the development of carcinoma, especially if they become pedunculated, relates primarily to the circulatory and nutritional changes they produce in the neighboring mucosa. We are indebted to Sitzenfrey[20] for a comprehensive description of the changes which occurred in 2 cases. In the first instance, the histology of the curettings in a case of necrotic submucous fibroid showed an immature epidermization and a slight papillary proliferation of the surface epithelium and mouths of the gland ducts. In one area the cells became more atypical and heterotopic, suggesting at two points a beginning invasion of the underlying stroma, from which he regarded the case as strongly suspicious of a malignant formation. The case remained well, however,

during four and one-half years of observation. In the other case, aged fifty years, a submucous fibroid had been removed six years previously. A curettage for bleeding and discharge revealed an extensive metaplastic growth of surface epithelium and deep invasion of the gland ducts. Because of her age, the presence of a necrotic polyp and other submucous myomata, a hysterectomy was performed. The uterine mucosa had a rigid, white opaque appearance, except near the insertion of a fibrous polyp where it appeared to be softer. Microscopically, the mucosa was generally epidermized from the upper part of the cervix to the fundus as a result of a long-existing pyometra. Two layers could be distinguished in most of the areas; a markedly hornified and a proliferating germinative, qualitatively sufficiently atypical in a few areas both on the surface and in the gland to arouse suspicion of a malignant change, but for some time it was regarded as a benign epidermization. Subsequently, however, von Franque discovered in a section of the anterior wall an area in which the atypical character of the cells, the heterotopia and stroma invasion appeared to justify the diagnosis of carcinoma. In this area a figure is shown of atypical cell growth bursting through the membrana propria at the fundus of a gland, while the epithelium nearer the mouth of the gland appeared normal. In this connection, Sitzenfrey's observation of another case, aged twenty-eight years, is important. After a manual extraction of the placenta and a puerperal infection atypical bleeding occurred over a period of two years, during which three curettings were performed. The first curettings showed a very marked overgrowth of both surface and gland epithelium in association with the changes of a diffuse chronic endometritis, but there were none of the features of a neoplasm. The subsequent curettings showed a marked regression of the process, in the last, only a few places presenting a slight stratification of both surface and gland epithelium. Similar changes of

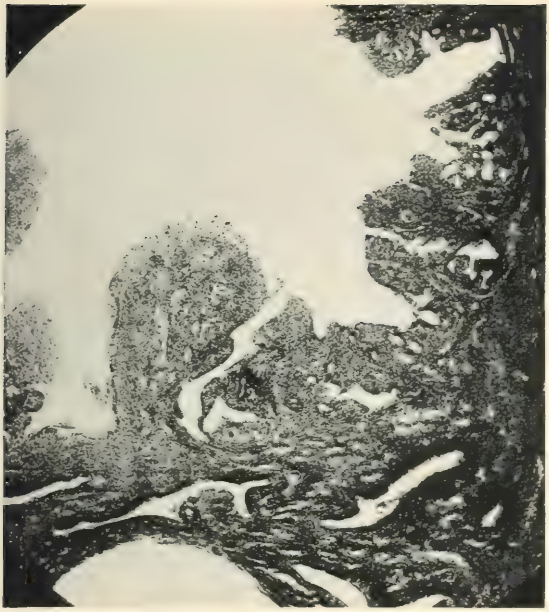

Fig. 1.—Papillary erosion. Chronic endocervicitis. Slight epithelial proliferation.

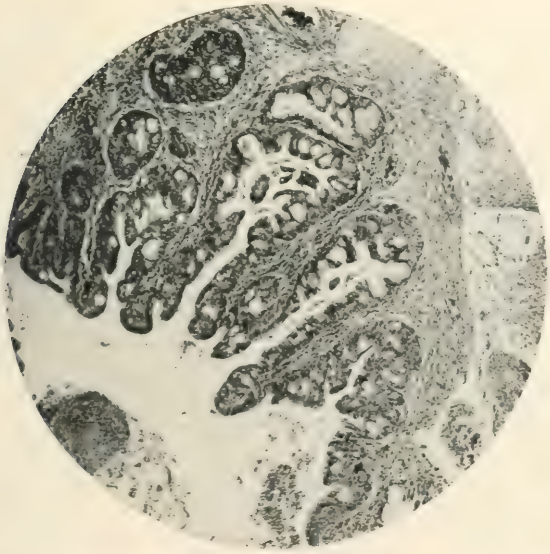

Fig. 2.—Cervical polyp. Marked papillary overgrowth. Mucoid degeneration of cells.

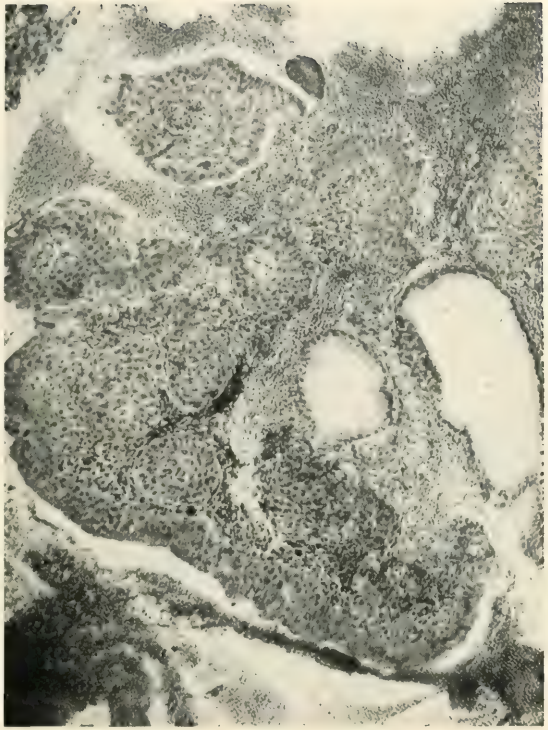

Fig. 3.—Epidermoid metaplasia in a cervical erosion. Pregnancy.

Fig. 4.—Small mucous polyp. Excessive epidermoid metaplasia.

FIG. 5.—Cervical polyp. Extensive papillary and epidermoid proliferation.

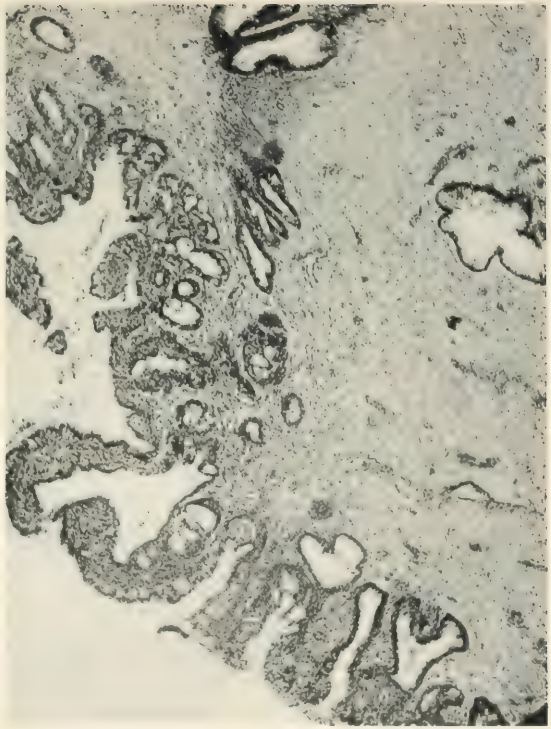

FIG. 6.—Papillary endocervicitis. Miniature island of epidermization.

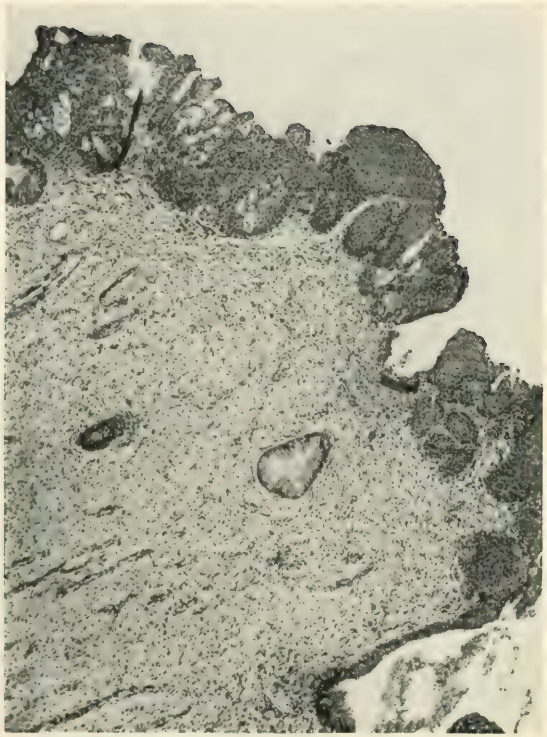

FIG. 7.—Patches of cervical leucoplakia.

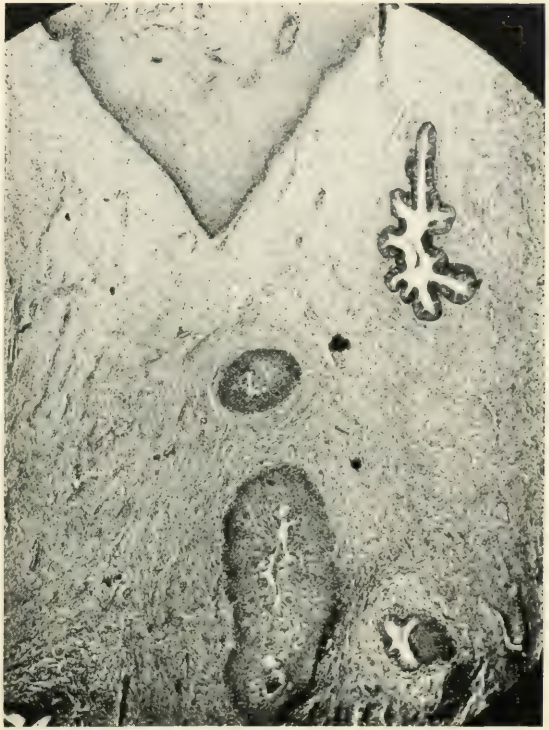

FIG. 8.—Downgrowth from a completely epidermized surface.

FIG. 9.—Epidermization of the cervical mucosa. Leucoplakia.

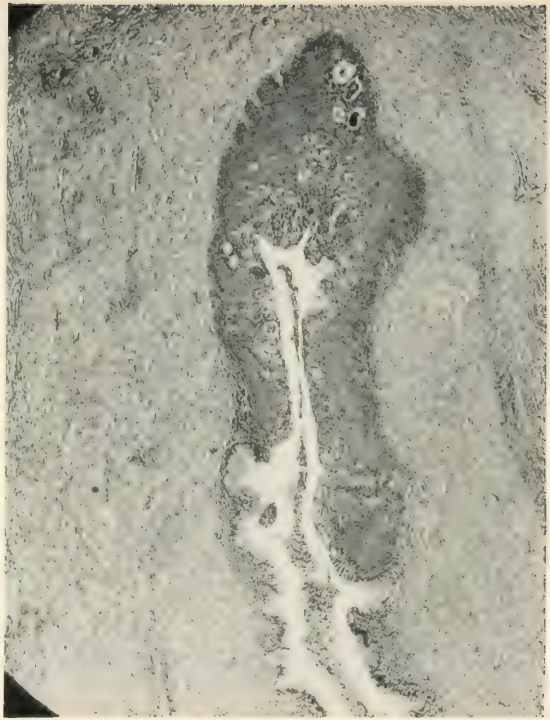

FIG. 10.—Metaplasia and proliferation in deep isolated cervical gland. Periglandular interstitial inflammation.

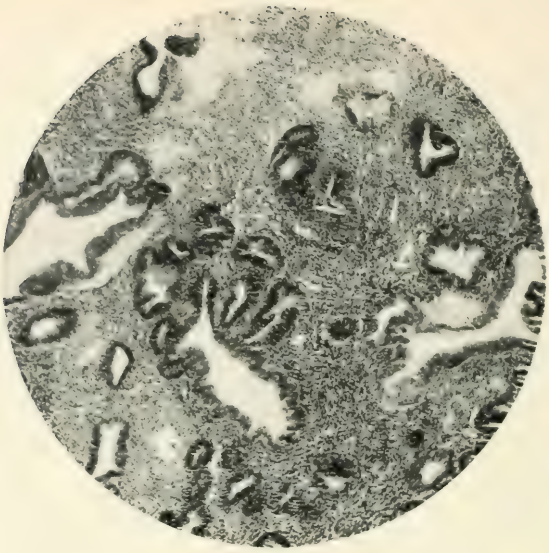

Fig. 11.—Precancerous gland hyperplasia of corpus.

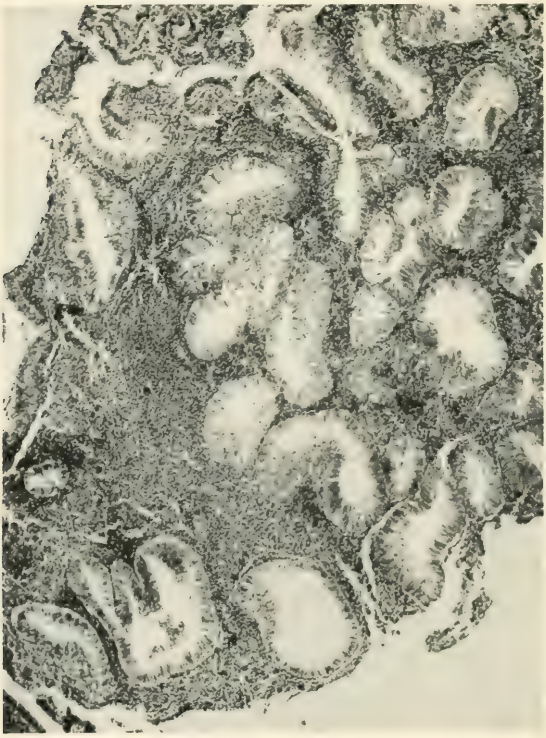

Fig. 12.—Advanced precancerous hyperplasia of corpus.

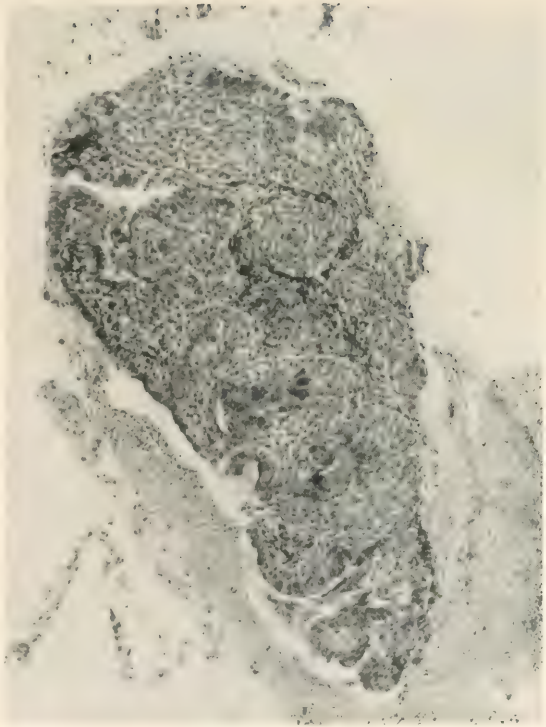

FIG. 13.—Atypical proliferation. Acute endometritis.

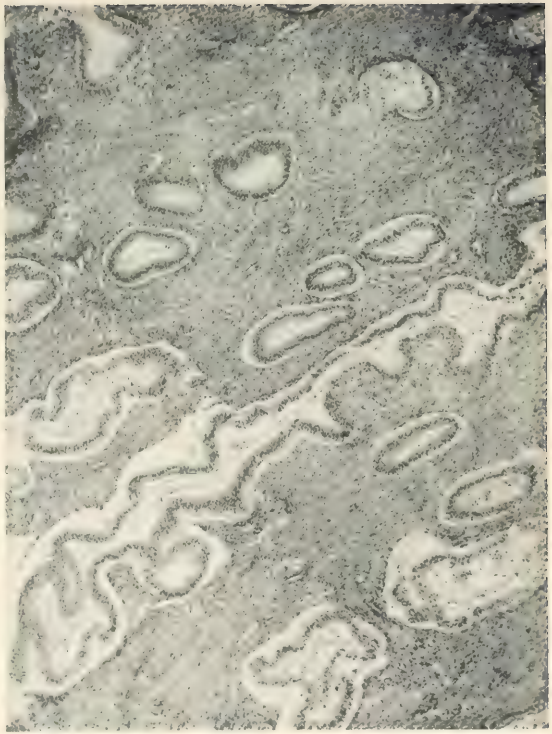

FIG. 14.—Beginning adenoma of the cervix.

benign epidermization were observed by Hengge[17] in 2 cases, aged forty-four and forty-nine years.

Glandular Hypertrophy and Hyperplasia. The glandular type of uterine cancer presents greater difficulties in the diagnosis of its incipient stage than the other forms, because the preservation of the normal gland type persists in so many instances until the amount of neoplastic structure has reached bulky proportions. The frequency also of advanced grades of gland hypertrophy and hyperplasia in menstruation, pregnancy, and chronic inflammatory conditions adds to the difficulty, making it at times quite insuperable. The claim of Gebhard[14] that a malignant adenoma arises by a gradual transition from the ordinary form of hypertrophy and hyperplasia is not supported by the majority of pathologists. Baecker,[52] however, reports a case in which during a period of ten years the uterus was curetted twenty times. The first 18 examinations showed ordinary hyperplasia, the nineteenth a benign adenoma, and the last a definite malignant neoplasm. Schottlaender and Kermauner,[4] in an analysis of the histological criteria of their cases, do not minimize the difficulties which the diagnosis of this type of growth presents in its inception, but in cases in which the change is limited even to the upper layers of the mucosa, in which the only destructive sign is that of the lessened amount of interglandular stroma, in which the eversions and inversions of the gland epithelium are atypically excessive, and in which the staining quality of the cells, especially of the nuclei, is altered, they offer a description which make the diagnosis of a beginning neoplastic growth something more than a subjective feeling. Whenever minimal amounts of such morphological change occur in definitely focal areas of otherwise normal structure, especially if physiological and other pathological causes may be excluded, and when they occur at the age when malignant growth is most common, are we not justified in applying the term "precancerous?"

Cullen has described the differential features of glandular carcinoma of the corpus uteri, and in a few of his cases illustrations and interpretations are given which seem pertinent to our subject.* Atypical proliferation of both surface and gland epithelium are seen which he defines to be suspicious, or probable areas of beginning carcinoma, the definite diagnosis, however, depending upon the presence of a macroscopic tumor, or the existence in other parts of a fully established growth. His case No. 4598, page 527, appears to the writer to be very suggestive of a precancerous change. Two illustrations are given showing an atypical proliferation of epithelium, one on the surface and the other in a gland, which created enough suspicion of malignancy in the author's mind to request the patient to travel 300 miles for a second curetting. Nothing was found at the subsequent operation, performed three months after the first, and the patient's condition was reported to be well three years afterward. Cullen's conclusion from the sequence of events that the patient did not have a fully established growth is undoubtedly correct, but to the writer it seems reasonable to make an interpretation other than that such a proliferation was simply part of an acute endometritis. The argument that solid masses of cellular proliferation, such as are shown in one of the illustrations, are not characteristic of early adenocarcinoma of the uterus, is true, but from the literature which the writer has given it seems not at all unlikely that both the surface and intraglandular proliferation may express the presence of focal areas of metaplasia, perhaps in the process of becoming leukoplakia as a result of a gonorrhea, of which the patient's history was said to be suspicious. If so, the case may be reasonably considered precancerous.

As an additional contribution to the literature of the

* Pages 323, 444, 526, 527.

subject of precancerous change the writer offers the following cases which he has collected from the uterine material in the Pathological Laboratory of the Cornell University Medical College:

Case 1.—Papillary erosion. Chronic endocervicitis. Slight epithelial proliferation (Fig. 1).

Slide submitted to the laboratory for diagnosis. The stroma shows an advanced chronic interstitial inflammation. There are numerous dilated follicles projecting into the area of the mucosa, which is thrown into papillary tufts, covered in the recesses by normal cylindrical epithelium, but largely devoid of epithelium on the tops. One or two places, however, give evidence of epithelial proliferation into several layers. There are numerous sections of glands within the stroma of the tufts, but there is insufficient evidence to make the diagnosis of a beginning neoplasm.

Case 2.—Cervical polyp. Marked papillary overgrowth (Fig. 2). Slide was submitted to the laboratory for diagnosis. The surface is covered with stratified epithelium except in the area shown in Fig. 2, in which the stroma is scanty and there is an appearance of newly formed glands. Mucoid degeneration of the cells is marked. The atypical qualities are more apparent than in Case 1, but it is difficult to define its actual relation to a tumor process.

Case 3.—Epidermoid metaplasia in a cervical erosion. Pregnancy (Fig. 3).

Age, twenty-eight years. Pregnancy in third month. Atypical bleeding from the surface of an ectropion. A section of a small piece removed for diagnosis shows the surface is covered by a thin layer of stratified epithelium which is not more than three or four cells deep, the most superficial of which appear to be cylindrical. In close proximity to two normal glands and immediately beneath the surface epithelium, is a cluster of glands filled with epithelial cells that are not atypical enough to be designated

cancer-nests, but more so than is usually seen in a simple erosion. The disproportionate amount of metaplasia in these glands as compared with that on the surface is alone an atypical change. It has been designated a precancerous change, and the clinician has been requested to make another diagnostic excision in a month.

Case 4.—Small mucous polyp. Cervical erosion. Excessive epidermoid metaplasia (Fig. 4).

Clinical History. Age, forty-seven years. Mother of 6 children, last nine years ago. Menstruation scanty. Discharge for some time, lately tinged with blood. Cervix was slightly ectropic and just within the external os there was a very small polyp which was excised for diagnosis.

The histological examination shows a normal cylindrical epithelium changing abruptly into a slightly thickened stratified layer which presents considerable papillary downgrowth. The glands in this area are normal. In the area shown in Fig. 4 there are numerous papillary outgrowths mostly covered with normal cylindrical epithelium, beneath which are numerous and irregular metaplastic glands, mingling apparently with similar metaplastic outgrowths from an underlying hypertrophic gland. There is no trace of hornification, but there is a proliferation of the deeper layers and a suggestive irregular outline to the glands. The quality of the cells, however, is mostly benign and the process appears to be a very atypical metaplastic change to which we would apply the term precancerous. The patient refused an amputation of the cervix, but there is every reason to believe that she is well, one year after the examination was made.

Case 5.—Cervical polyp. Extensive papillary and epidermoid proliferation (Fig. 5).

Clinical history not available. The papillary structure is excessive, showing numerous areas with little if any stroma between contiguous papillæ with apparently normal cells.

In the field shown in Fig. 5, there is so much metaplasia and overgrowth that it is difficult to say that a carcinoma has not already become established. There are traces of heterotopia and stroma invasion.

Case 6.—Papillary endocervicitis. Miniature islands of epidermization (Fig. 6).

Slide submitted to the laboratory for diagnosis. Clinical history and gross material not available. The section shows the sign of a chronic inflammation and a slight papillary formation. The covering of cylindrical cells is generally well preserved. In one or two areas there are very small islands of epidermization which appear to be miniature foci of leukoplakia. In another section there is a larger island showing the change. The interest in these sections relates to the changes seen in Cases 7 and 8.

Case 7.—Leukoplakia of the cervix. Papillary proliferation. History of syphilis (Figs. 7 and 8).

Clinical History. Age, fifty years; married twenty-seven years; 6 children, 5 miscarriages. Typhoid fever at twelve, scarlet fever at fourteen, measles at forty. At fourteen years of age ulcers which appeared on both legs persisted until she was twenty-six. When thirty she was in a hospital for ten weeks with double otitis media and a disease of the throat which resulted in a perforation of the palate. From an investigation made at that time it was learned that both her father and mother had syphilis before she was born. A brother also had the disease. She was treated for syphilis periodically for some time thereafter. At thirty-three she married and two of her children died. Menstruation as a girl was painful and she had leucorrhea. It has always been profuse and during the past five years irregular. The last period began seven weeks before admission to the hospital and continued for six weeks. She has recently had attacks of vertigo and pains in the legs, especially marked in the left foot so that its use has been difficult.

Physical Examination. There is a scar at the site of the perforation of the palate, and there are scars of old lesions in the neck posteriorly on the left side, and at the sites of the previous ulcers of the legs. There is no paralysis and there are no eye symptoms. The Wassermann test is positive. The uterus is large and retroverted. There is no thickening of the appendages. The cervix is badly "eroded" and presents some areas suspicious of carcinoma. A hysterectomy was performed. Gross appearance: The uterus is much enlarged but, with the exception of a small intramural fibroid above the cervix, there is no apparent tumor growth. The normal rugæ of the cervical mucosa have entirely disappeared, and its surface is covered with whitish yellow, slightly elevated patches, which are smaller in the region of the internal os. The mucosa of the corpus appears to be thin and congested.

Histology. Section of the cervical canal shows a moderately thickened layer of stratified epithelium with little tendency to downgrowth, overlying a few dilated glands and broken by the openings of a few slightly hypertrophic glands. The chief features are shown in Fig. 7, in which numerous islands of epidermization are seen lying on and within a papillary meshwork, the small papillæ joining each other in such a way as make apparent a mass of newly formed glands. At intervals normal glands open upon the meshwork, between which are small areas of epidermized glands appearing like epithelial nests. In another area, shown in Fig. 8, there is a downgrowth from a more completely epidermized surface, representing the metaplastic transformation of a gland, which because of the direction of the section resembles carcinoma nests. The mucosa of the corpus shows only the changes of an atrophic endometritis. Some sections of the stroma show marked evidence of a chronic myositis. There is a focal overgrowth of small muscle cells, with hyperchromatic nuclei, distended lymph

channels, and numerous new bloodvessels with thickened walls. We have then in a case, giving a history of syphilis and other severe infections and presenting clinically strong suspicions of a cancer of the cervix, typical patches of leukoplakia, extending along the entire course of the cervical canal and grouped within areas of a papillary proliferation of epithelium. In other words, there are the prototypes of two forms of malignant change—epidermoid carcinoma and papillary adenocarcinoma of the cervix.

Case 8.—Epidermization of the cervical mucosa. Leukoplakia. Pyosalpinx. Tuboövarian abscess (Fig. 9).

Clinical History. Age, thirty-three years; single; no children. Had complained of profuse menstruation, discharge and pelvic pain. No history of syphilis. The examination showed a large hard cervix which was markedly "eroded." A clinical diagnosis of chronic endocervicitis with erosion was made and the cervix was amputated. Diseased appendages were subsequently discovered and an operation revealed a tuboövarian abscess on one side and a pyosalpinx on the other. The gross material is not available.

Histology. A section of the cervix shows the cervical mucosa transformed into a thickened layer of stratified squamous epithelium, with a marked tendency in areas to hornification and well-marked papillary downgrowth. In the field shown in Fig. 9, the metaplasia has extended into a gland, around the lower end of which is a thin layer of round-cell infiltration. The stroma shows marked hyperplastic change with numerous bloodvessels and perivascular areas of fibrosis. The cells of the epithelial layers are well defined but the basal cells show a slight proliferation in some places. If a similar process covered the entire mucosa of the corpus, it would present a picture not unlike that in von Rosthorn's[34] case of ichthyosis, which Hitschmann[22] and others have said was an established carcinoma.

Case 9.—Isolated cervical gland showing metaplasia and proliferation. Periglandular interstitial inflammation (Fig. 10).

No information is available regarding the clinical history or gross material. The gland appears to be isolated within the deep structure of the cervix, and partly transformed into a stratified epithelium which gives some evidence of proliferation. The quality of the cells is slightly atypical. In other sections there is a normal stratified surface epithelium overlying two or three superficial glands and follicles. An accurate interpretation of the changes in this gland is impossible to make, but there is an undoubted relation between the epithelial changes and the periglandular interstitial inflammation. As a prototype of a tumor growth we think of those cases in which a malignant growth begins clinically as a hard nodule within the stroma of the cervix.

Case 10.—Precancerous gland hyperplasia of corpus. Clinical history suspicious of cancer (Fig. 11).

Clinical History. Age, fifty-two years. Menopause occurred seven years previously. There had been continuous bleeding for eight weeks. Has been curetted three times, the last one week ago, after which the bleeding ceased and has not yet recurred. The enlarged size of the uterus, however, has not yet diminished. The material removed by the first two curettings is said by a competent pathologist to present the same picture as that from the last operation which was sent to the laboratory for diagnosis.

Histology. There is advanced glandular hypertrophy and hyperplasia throughout all of the areas. The stroma, however, is abundant except in a few places where the glands have become dilated into small cystic cavities lined by one layer of low cuboidal epithelium. In the area shown in Fig. 11, although there is no appreciable difference in the amount of interstitial stroma, the glandular structure is essentially altered. The epithelial outgrowths and ingrowths become a more distinct feature. The cells show a definite

tendency to assume an irregular form, to increase in size and to proliferate into more than one layer, and the nuclei are hyperchromatic. Now and then there are traces of breaking through the membrana propria. This case illustrates the immediately practical side of the problem. With such a clinical history the decision relative to therapy should be made by a competent clinician, provided he has a proper appreciation of the histologist's interpretation of the expression "precancerous." In this case a delay in radical surgical measures is planned.

Case 11.—Advanced precancerous hyperplasia of corpus. Fibromyoma (Fig. 12).

Age, thirty-seven years. Atypical bleeding. The uterus is much larger than normal, presumably because of the presence of an intramural fibroid.

Histology. The curetted material is decidedly different from that of Case 10, but it is doubtful if a macroscopic growth other than the fibroid will be found. The gland hyperplasia is considerably more advanced, but in numerous areas the stroma is sufficiently abundant to exclude a tumor process. In the area shown in Fig. 12 the glands are close together, but the cells maintain a better alignment than they do in Case 10. Their altered qualities are chiefly expressed by the changes in the staining qualities of the cell protoplasm. Ingrowths and outgrowths are numerous and there appears to be a tendency to form more than one layer. Heterotopia is faintly expressed. Because of the presence of the fibroid, the decision in regard to the correct therapeutic procedure is easier to make. Unfortunately we have not yet received the gross specimen because the patient has thus far refused a radical operation.

Case 12.—Atypical epithelial proliferation. Acute endometritis (Fig. 13).

Clinical History. Age, twenty-eight years. One child six years previously. Several attempts have been made during

the past year to hasten delayed menstrual periods. Atypical bleeding for several weeks. Curettage was performed.

Histology. The changes are mostly those of an acute endometritis. In a few areas, however, there are traces of epithelial overgrowth, in which the normal quality of the cells is altered, showing a few large irregular and hyperchromatic nuclei, clumped not unlike that seen in giant-cell formation (Fig. 13). From the benign character of the clinical history and the presence of an acute endometritis, we are unable to attach much serious importance to these focal changes.

Case 13.—Beginning adenoma of the cervix (Fig. 14).

The clinical history and gross material are not available. The section is that of a cervix with normal surface epithelium and a few superficial erosion follicles. In Fig. 14, there is shown gland hypertrophy and hyperplasia of sufficient amount to closely approach that found in a tumor growth. It is situated deeply within the stroma, without signs of inflammatory change. The lining cells everywhere preserve the normal type of mucous cells. It seems not improbable that such a process is a prototype of that infrequent form of adenoma of the cervix, in which the mucous cells preserve their normal type after the glandular growth has reached bulky proportions and become clinically malignant.

Summery. It seems to the writer that the evidence in the literature and the material which he has presented justifies the following comments:

1. As the positive identification of a malignant neoplasm cannot be made histologically until definite destructive capacity is recognized, it seems reasonable to relate more definitely the other histological criteria of cancer to the developmental stage of its growth, the closeness of the relation in a specific case depending upon the quality and quantity of such criteria as may be present.

2. If so, we find in the study of uterine pathology numerous

morphological alterations of epithelial growth which differ but little from the regenerative activity of benign lesions, but which after a longer or shorter time show features that are differentiated with difficulty from the alterations we know typify malignant neoplasm.

3. The strongest support of this assumption is derived from the reproduction of types which are seen in the different stages of their progress. We find the atypical features of a healing erosion, for example, determined by the original type of the primary erosion—simple, papillary, follicular; and we find the atypical types again reproduced in the different types of full established uterine cancer. In the writer's cases, there are atypical healing erosions which are prototypes of either an epidermoid cancer or a papillary adenocarcinoma. There are leukoplakias which are prototypes of adult acanthomata. There are glandular hyperplasias which lead to adenoma or adenocarcinoma. Finally, there are focal areas leukoplakia, combined with adenomatous hyperplasia, which may well furnish an origin for tumors designated as adenoacanthomata. In short, for each type of fully developed carcinoma there is a corresponding type of benign and intermediary change.

4. Clinical observation increasingly confirms the sequence of definite benign lesions in the uterus and cancer, but its evidence is thus far too scanty either to confirm or deny their histogenetic relations. In order to work out this problem a closer coöperation is required between the clinician and the pathologist, with the idea constantly in mind that the morphological features of intermediary stages may exist. It is no argument against such an assumption because no tumor process presents or follows in a given case. The evidence is already sufficient to show that a fully established cancer may exist for a certain time without giving gross evidence of its presence, and numerous cases are recorded in which the curette has completely removed the disease.

5. There is no reason to assume that precancerous changes without treatment always develop into malignant growths. We know different types of fully established tumors have a different capacity to grow and destroy rapidly or slowly, and it does not seem reasonable to assume that a developing cancer has the same momentum that a fully established tumor possesses.

6. In the study of beginning cancer of the uterus, Sitzenfrey,[20] Schauenstein,[21] Schottlaender-Kermauner,[4] and Pronai[53] direct attention to the important observation that a certain type of early cancer spreads superficially over wide areas before showing marked invasive feature. It has occurred to the writer that such a mode of growth may account in some measure for the widespread extent of the process before it receives the attention of the clinician.

7. From a practical stand-point, the decision regarding the proper therapeutic procedure in these cases should be assumed by a competent clinician.

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References

1. Polese. Zentralbl. f. Gynäk., 1906, p. 284.
2. Ewing. Med. Rec., December 5, 1914.
3. Taussig. Trans. Am. Gynec. Soc., xxxvii, 322.
4. Schottlaender-Kermauner. Uteruskarzinom., 1912.
5. Fuetterer. Lubarsch-Ostertag, Ergebnisse, 1903, ii.
6. Possner. Virchows Arch. f. path. Anat., etc., Berlin, cxviii, 391.
7. Klein. München. med. Wchnschr., 1897, p. 23.
8. Mueller. Samml. klin. Vortr. u. F., Leipzig, 1906, p. 413.
9. Moericke. Ztschr. f. Geburtsh. u. Gynäk., vii, 84.
10. Meyer, R. Ztschr. f. Geburtsh. u. Gynäk., xxxviii, 234.
11. Friedlaender. Ztschr. f. Geburtsh. u. Gynäk., xxxviii, 8.
12. Werth. Arch. f. Gynäk., xlix, 369.
13. Zeller. Ztschr. f. Geburtsh. u. Gynäk., xi, 56.
14. Gebhard. Ztschr. f. Geburtsh. u. Gynäk., xxiv, 1.

15. Von Franque. Ztschr. f. Geburtsh. u. Gynäk., xliv, 173; lx, 237.
16. Ruge and Veit. Ztschr. f. Geburtsh. u. Gynäk., vii, 138.
17. Hengge. Monatschr. f. Geburtsh. u. Gynäk., xv, 41.
18. Oeri. Ztschr. f. Geburtsh. u. Gynäk., lvii, 384.
19. Kaufmann. Lehrb. d. Spez. path. Anat., vol. iii.
20. Sitzenfrey. Ztschr. f. Geburtsh. u. Gynäk., lxix, 385.
21. Schauenstein. Gynäk. Rundschau, i, 17, 574, 605; Arch. f. Gynäk., lxxxv, 576, 629.
22. Hitschmann. Arch. f. Gynäk., lxix, 629.
23. Beckmann. Ztschr. f. Geburtsh. u. Gynäk., xlv, 492.
24. Amann. Lehrb. der milkr.-gynäk. Diagnostik, 1897, p. 85.
25. Winter. Veit's Handb., 3, 2, 607.
26. Koblanck. Veit's Handb., p. 2.
27. Alfieri. Zentralbl. f. Gynäk., 1908, 232.
28. Rubin. Am. Jour. Obst., New York, lxii, 668.
29. K. Ulesko-Stroganowa. Zentralbl. f. Gynäk., 1911, p. 21.
30. Cullen. Cancer of the Uterus, 1900.
31. Weir. New York Med. Jour., 1875, xxi, 240.
32. Berkeley and Bonney. British Med. Jour., 1908.
33. Sweeney. Am. Jour. Obst., New York, lxviii, 243–343.
34. Von Rosthorn. Festschr. der Deutsch. Gesell. f. Gynäk., 1894.
35. d'Hotman de Villiers and Scraps, 1896, cited by Jayl and Bender.
36. Jayle and Bender. Rev. de gynéc. et chir. abdom., 1905.
37. Von Pierung. Ztschr. f. ges. Heilk. (etc.), Kassel, 1887.
38. Benckiser. Ztschr. f. Geburtsh. u. Gynäk., xxii, 337.
39. Hofmeier. Ztschr. f. Geburtsh. u. Gynäk., vol. xxxii.
40 Gellhorn. Ztschr. f. Geburtsh. u. Gynäk., xxxvi, 430.
41. Pfannenstiel. Zentralbl. f. Gynäk., 1892, p. 841.
42. Klob. Path. Anat. d. Weibl. Sexualorgane.
43. Billroth. Ueber den Bau der Schleimpolypen, 1855.
44. Keitler. Hegar's Beitr. z. Geburtsh. u. Gynäk., iii, 309.
45. Kroemer. Arch. f. Gynäk., lxv, 626.
46. Bulius. Deutsch. med. Wchnschr., 1905.
47. Kuestner. Zentralbl. f. Gynäk., 1884, p. 321.
48. Gessner. Ztschr. f. Geburtsh. u. Gynäk., xxxiv, 387.
49. Williams, J. Cancer.
50. Opitz. Ztschr. f. Geburtsh. u. Gynäk., xlix, 169.
52. Baecker. Zentralbl. f. Gynäk., 1904, p. 735.
53. Pronai. Arch. f. Gynäk., lxxxix, 596.

THE CLINICAL COURSE OF CANCER IN THE LIGHT OF CANCER RESEARCH

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(By Invitation)

In attempting to deal with the clinical course of cancer in the light of cancer research, one immediately realizes how little the discoveries of the investigator in this field have come to influence the clinician. This is an unhappy circumstance, for in the last eighteen years our knowledge of the cancer problem has been greatly advanced. The time has come when some of the advances of cancer research should become the possession of the clinician and should be a part of his reasoning and guide him in the consideration of clinical cases. No doubt the clinician has properly felt that modern cancer research has as yet produced but little of practical value and so far as revolutionary methods of treatment or diagnosis are concerned such a view is at least in part justifiable.

There are many ways in which the classical clinical picture of cancer should be modified by the discoveries in this field in the last two decades. Let us choose for consideration the immunity to cancer. Our knowledge of this subject has been gained by experimental studies with the smaller animals. Can we apply our knowledge of this phenomenon to the field of human cancer? To do this we must understand that our conception of the cancer problem and the group of

diseases known as malignant has been greatly advanced in the last few years, and that much of the vagueness and uncertainty of the earlier period of research has been cleared away by a better understanding of the problem itself.

First of all the intensive study of types of cancer in the lower animals has shown us conclusively that cancer is not one disease but a great group of diseases. Of some of the neoplasms in the lower animals we have learned much. In one group, the chicken sarcomas, we have learned the cause, and in certain other groups, like the round-cell sarcoma in the dog, the spindle-cell sarcoma of the rabbit, the endemic sarcocarcinoma of the nasal passages in horses and cows, described by Stenström, carcinoma in the esophagus and stomach of rats, by Fibiger, and that interesting disease known as carcinoma of the thyroid in the salmonoid fishes, our knowledge of the probable etiology is well advanced. With more exact knowledge the identity of each one of these diseases has become more pronounced, and so we know of a certainty that the different types of cancer which we have viewed collectively must now be studied individually. This has enormously broadened the cancer problem. It precludes the possibility of a sudden discovery which shall solve the whole problem readily, but it affords us the certainty that by studying its component parts and by the continuation of the progress which research has made in the past, we shall ultimately come to understand that great group of diseases which we have recognized as cancer.

Investigators of cancer have worked with many types of neoplasms in the lower animals. We may choose the subject of immunity as affording a phenomenon which is common to all of them. We now know that when the disease is transplanted, there is aroused in the organism of the affected individual a resistance. This resistance is greatest in the earlier stages of the disease. It is the force which holds the disease dormant or by its loss permits its progress, and in

some instances it is the force which succeeds in overcoming the disease and producing those rare occurrences of spontaneous recovery, which have been observed experimentally and naturally in animals and occasionally in human beings.

In 1904 the workers in Buffalo had the good fortune to observe that mice inoculated with mouse cancer would sometimes develop tumors even of considerable size, that the tumors would then retrograde and disappear, leaving the animal immune to further inoculations. This fact has been repeatedly observed in various types of tumors in lower animals in all the laboratories of the world engaged in cancer research. It was also found that the chance of spontaneous recovery in inoculated animals was inversely proportional to the duration of the disease and the size of the growth, meaning that the chances of recovery are greatest in the very beginning of the disease. This observation is of great importance to the surgeon for the reason that he is constantly endeavoring to secure cancer cases early, and it explains why surgical interference in the very beginning of the disease is so much more successful than later. We were able to collect authentic cases from the literature which showed that in the earliest stages of the disease, even when all the growth was not removed by the surgeon, in some instances what was left retrograded and the immune forces were sufficient, on the removal of the greater portion of the growth, to overcome the rest.

In the first observations in 1904, we were able to demonstrate under the conditions which were then obtained in the mouse tumor which we were studying, evidences of a passive immunity. We found that the blood of mice which had recovered spontaneously had an inhibiting effect upon the growth of tumors if the animal was treated when the inoculated tumor was small. The blood of recovered animals had an inhibiting effect upon the rate of growth of more advanced tumors so that there was a time when all the treated animals

were alive and all the controls were dead. Furthermore, it was shown that in the early stages after inoculation the immunity aroused by the growth of the primary inoculation was sufficient to prevent, and for a considerable period, a successful secondary inoculation. This showed the existence of concomitant immunity. For the purpose of further demonstrating the existence of this concomitant immunity, experiments were carried out to determine how it might be injured, and it was found that a mouse with an inoculated tumor which was growing but slowly or was nearly stationary could have its immunity exhausted by bleeding the animal. Loss of blood, either as a substantial hemorrhage or the loss of two or three drops on successive days, would result in a sudden acceleration of the rate of growth of the tumor with a more rapid fatal termination than in the control animals. The existence of immune forces which check the rate of growth of neoplasms, can be traced in spontaneous tumors in animals, and on consideration the clinician will readily see that this offers an illuminating explanation of the variations in rate of growth and long periods of latency in clinical cancer in human beings.

Having determined that loss of blood injured the resistence it naturally occurred to us to determine the effect of anesthetics upon the rate of growth and we found that inoculated tumors in animals which were chloroformed for a considerable period, or for short periods on succeeding days, developed a much greater rapidity of growth than control animals. In this connection, chloroform was found to be more injurious than ether.

Three years ago Dr. Tyzzer, working with carcinoma of the breast in the Japanese waltzing mouse, carried out an elaborate series of carefully controlled experiments which showed that operations upon inoculated tumors accelerated the rate of growth of metastases or of secondary implants. In these experiments he used ether anesthesia and they

were of course associated with the usual loss of blood attendant upon such operations.

These observations are surely of importance to the surgeon. What surgeon has not occasionally encountered a favorable-looking cancer case in which the growth has progressed but slowly, which after a radical operation with anesthesia suddenly recurs and grows with a greatly accelerated rate of growth terminating rapidly in death. Every surgeon has had the experience of seeing cases which he wished he had not operated upon, in that the operation did not prevent recurrence and after prompt recurrence the progress of the disease was greatly accelerated. Experiments are now being conducted to determine whether nitrous oxide anesthesia is less injurious than chloroform or ether. In the same article Dr. Tyzzer showed that in the Japanese waltzing mouse tumor, which animal possesses a complete susceptibility to the tumor, and in which immune phenomena are nearly absent, by massaging the tumor he was able to produce metastases almost at will, even in the earliest stages of the disease. In two other propagable tumors, one a cancer of the breast in a mouse, the other a sarcoma in a mouse, such massage during the early stage did not produce metastases. That in many primary human tumors the immunity is sufficient to prevent the metastases, may be deduced from the observation of Goldmann who showed in 1897 by a careful study of cancer of the breast in human beings, that cancer cells enter the circulation in many such instances without the production of metastases.

The nature of the immunity to cancer has for ten years been the subject of active discussion. The so-called "atreptic" theory for cancer immunity advanced by Ehrlich has been generally disproved by investigators. Our original observation that there were probably immune forces in the blood serum of recovered animals did not meet with prompt or wide acceptance because of the constantly changing con-

ditions which surround such experiments when carried out on living animals.

With the round-cell sarcoma of the dog Crile and Beebe were very shortly able to demonstrate the existance of immune bodies in the blood of recovered dogs by transfusing such blood into animals with tumors and observing prompt regression and recovery in repeated instances. Lewin, in Berlin, succeeded in demonstrating the existence of immune forces in the blood of recovered rats in a spindle-cell sarcoma of the rat, and von Dungern found marked evidence of passive immunity in the spindle-cell sarcoma of the German hare. Other investigators, working with different tumors and probably under unfavorable conditions of experimentation have failed to repeat the earlier experiments with the mouse tumors. Clowes, in the Buffalo laboratory in 1904, mixed the blood of recovered animals with a given measured amount of mouse cancer before inoculation and was able to show that under these conditions the number of successful inoculations was markedly reduced. Bashford found that mouse cancer cells inoculated into the circulation of spontaneously recovered mice failed to produce tumors and disappeared, and Tyzzer has recently shown that by treating the graft of a Japanese waltzing mouse tumor with the blood of recoverd white mice he was able to produce in the immediate neighborhood of these grafts the marked cellular reaction which is found in resistant animals. Weil, who some years ago carried out a series of experiments with the Buffalo spindle-cell sarcoma of the rat and was unable to convince himself of the existence of immune bodies in the blood, has just reported at the meeting of the American Association for Cancer Research on May 8th that by modifying the experimental conditions he has now been able to demonstrate to his satisfaction the existence of definite immune forces in the blood of spontaneously recovered rats.

It is not necessary for us to attempt to consider the exact nature of this immunity, but we might point out that the immunity is probably specific for each type of cancer and that in the chicken sarcomas of Rous, where this investigator has been able in three different types of sarcoma to filter out a virus, he has been able to test the question which has long been before investigators whether the immunity to cancer is directed toward the cause of cancer, or is a cytolytic action against the cells, and Rous has been able to show that a chicken which is immunized against the spindle-cell sarcoma is not immune to the virus of the osteochondrosarcoma although both of these tumors are of connective tissue origin.

It may well be asked to what extent we may apply these facts so laboriously wrung from experiments upon animals, to cancer in human beings. Some of these data must immediately awaken sympathetic response in the mind of the physician and it is not for me to point out the application, but it would greatly interest any clinician to read again a very suggestive article by Petersen, in the *Beiträge zur klinischen Chirurgie*, Volume thirty-two and thirty-four, 1902, in which he postulated the existence of immune forces in human cancer cases. Petersen's theories were deduced from a careful and exact study of cancer in human beings, and preceded by two years the first conclusive proofs of immunity to cancer in animals. He thought of the possible antibodies as being of a cytolytic nature, but such a conception was at that time very natural.

Marked advances have been made in the last few years in our understanding of the nature of this immunity to cancer. It was shown early in experimental work with animals that among normal tissues the spleen was particularly efficacious in immunizing animals against inoculation with propagable cancer. Bridré and Apolant immunized animals with normal spleen tissue and Braunstein showed that by removing the

spleens of resistant animals they became susceptible; but the definite demonstration that the immunity to cancer has its origin in the splenolymphatic system, which is the seat of all known immunities to infectious diseases or non-specific substances, was not conclusively demonstrated until Murphy, by an ingenious series of experiments, showed that in chick embryos the growth of normal chicken spleen would prevent the growth of neoplasms inoculated into the embryo which, in the absence of an accompanying growth of spleen tissue would grow readily. He also showed that neoplasms which could be successfully ingrafted in the chick embryo could be made to retrograde by the subsequent implantation and growth of normal chicken spleen, and following these facts he found that by injuring the spleen in resistant mice they could be made susceptible to the growth of mouse cancer or even of alien tumors so long as the injury to the spleen remained, and that with the regeneration of the splenolymphatic system the immune forces were reëstablished. Hence it is now definitely understood, first through the early experiments in Buffalo, with subsequent confirmation, that the immunity to cancer is evidenced by the existence of immune forces in the blood; second, the site of this immunity is in the splenolymphatic system, where all the known types of immunity take origin.

Reasoning from the experimental demonstration of these forces in inoculated animals to the existence of such forces in animals spontaneously suffering from cancer and to the phenomena observed in the clinical course of cancer in human beings, we have before us the logical explanation of many vagaries and ill-defined phenomena in cancer in man. We understand now why surgical interference is so successful in the very first stages of cancer and why it is so unsatisfactory in the later stages. We should be cautioned against tedious and long drawn out operations using chloroform or ether as an anesthetic, and associated with marked loss of blood; and

we can offer certain evidences to show that *x*-ray and radium exercise their curative effects through the immunity.

In 1905 in Buffalo we observed that tumors which were held stationary by *x*-ray treatments, could be made to grow by bleeding the animal exactly as in the case of tumors stationary in the natural course of the disease. From this we reasoned that *x*-ray and radium operated through the immunity. Recently Murphy has conclusively confirmed this view by showing that in spontaneous mouse tumors, if the tumors are removed and the tumor is given the *x*-ray treatment, they can be reinoculated into the animal with almost the same percentage of success as where no treatment is given. (In spontaneous tumors the primary tumor can be removed and portions of it can be reimplanted in practically 100 per cent. of cases.) Then Murphy showed that if the tumor was removed and the *x*-ray treatment was given to the mouse the reimplantation of a fragment of the tumor almost invariably failed, showing that the animal had been made resistant by the *x*-ray treatment. From this he properly reasons that the therapeutic effect of the *x*-ray or radium is in large part secondary and not alone the result of the direct action of these agents upon the tumors.

An understanding of these facts enables us to explain why in many instances a few treatments with the *x*-ray or radium produce marked benefit, and then suddenly without any apparent cause such treatments lose their effect and the tumor grows rapidly in the face of the treatment. Knowledge of the existence of immunity to cancer affords us the basis of research to determine the exact modus operandi of *x*-ray and radium, and will undoubtedly enable us to secure with certainty the beneficial results of these agents in those cases in which the existence of a sufficient immunity permits successful treatment.

These are some of the ways in which cancer research should assist the clinician in a better understanding of the clinical

course of cancer. Occasionally we hear expressions of pessimism regarding the advances of cancer research. This can only be attributed to ignorance of the great strides that have been made, and a complete lack of understanding of the promise the future offers. The outlook of cancer research and the prospects of practical help for the clinicians, are many times brighter today than they were eighteen years ago when experimental cancer research may be said to have been founded.

Bibliography

Apolant. Jour. ex. Ther., 1906, Heft 1, No. 2.
Braunstein. Berl. klin. Wchnschr., 1911, pp. 2029–2031.
Bridré. Annales de l'Institut Pasteur, 1907, p. 769.
Clowes and Baeslack. Med. News, November 18, 1905.
Crile and Beebe. Proc. Society for Experimental Biology and Medicine, 1906–7, No. 4, p. 118.
v. Dungern. München. med. Wchnschr., 1912, p. 238.
Fibiger. Berl. klin. Wchnschr., 1913, No. 7.
Goldmann. Beiträge z. klin. Chirur., 1897, Bd. xviii.
Lewin. Zeitschrift f. Krebsforschung, 1907–8, p. 306.
Murphy. Jour. Am. Med. Assn., 1914, lxii, No. 19, 1459; ibid., 1915, xxii, No. 15, 204; ibid., 1913, xvii, 482.
Petersen. Beiträge z. klin Chirurgie, 1902, Bd. 32 and 34.
Rous and Lange. Jour. ex. Med., 1913, xviii, 651.
Rous and Murphy. Jour. ex. Med., 1914, xx, 419.
Stenström. Communications de l'Institut de l'Etat a Stockholm, 1914, No. 5.
Tyzzer. Ztschr., f. Krebsforschung, 1913, xiii, 546.
Weil. Ztschr., f. Krebsforschung, 1913, xiii, 538.

THE TREATMENT OF CANCER OF THE UTERUS

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The treatment of cancer of the uterus—that will-o'-the-wisp of surgery—has for the last three decades been a bone of contention as regards the best method of circumventing the growth by surgical methods. The various forms of hysterectomy have been thoroughly tested, beginning, first, with the simple vaginal method, a large series of cases thus treated having been reported from American and European clinics. The final summary of results, however, after a probationary five-year period, showed the treatment to be lacking in effectiveness, first, because it was applicable to only a relatively small number of cases, and secondly, because the percentage of ultimate cures it yielded was lamentably small. Then came Schuchart's more radical vaginal hysterectomy, which, in the hands of a few experts, among the foremost of whom is Schuata, has given a larger rate of ultimate cures; it is, however, a very difficult operation, and is attended by a larger mortality, and is followed by serious vesical and ureteral sequelæ. Because of these objections, this method has received only limited approval from gynecologists.

Following this, the extended, or more radical abdominal, method came into vogue, and until three years ago continental gynecological literature was replete with the reports of cases from many clinics; these contained both favorable

and adverse criticism. About three years ago these reports suddenly ceased, to be almost entirely superseded by the consideration of radium and mesothorium as new and promising therapeutic agents.

This brief discussion of the rapid change of events in the surgical treatment of cancer leads to the inevitable conclusion that the surgical world is still very much at sea as regards the most effective method of dealing with this disease. A decided surgical advance has been made, but the progress is in no way commensurate with the effort that has been expended, for even in carefully selected cases the best series of radical operations still yields less than 50 per cent. of recoveries.

As a convincing evidence of the limitations of surgical applicability, we offer the results of our experience. In less than two years we have treated 49 cases of inoperable cancer of the uterus with radium, and during the same period only 12 cases have been considered as within radically operative limits. During the preceding ten years the number of radical operations performed was about 60. In other words, for 50 cases subjected to operation, at least 250 have been abandoned as hopeless. This personal observation has convinced us, more than ever before, of our grave shortcomings as regards the surgical treatment of uterine cancer.

Although the radical operation has given the best ultimate statistics, so far as the number of permanent cures is concerned, experience has proved that beyond doubt, it is also attended with an unavoidably high primary death-rate; that it is followed by serious postoperative sequelæ which are difficult to cure, and that, when these are irremediable, they leave our patients in a very wretched condition. Since the American Gynecological Society so thoroughly reviewed this subject four years ago, I have found no reason to alter my views as expressed at that time after a study of my own cases. The conclusions then reached were as follows:

"1. The operation, in expert hands, notwithstanding its high primary mortality, has given the greatest percentage of permanent cures of any therapeutic procedure thus far suggested for cancer of the cervix.

"2. While the foregoing conclusion is true, the general adoption of the operation, in view of its dangers and difficulties, is not to be advised until the primary mortality can be reduced to a much lower percentage by a simplification or a perfection of details.

"3. The abandonment of the extensive glandular dissection is justified, because this detail adds to the hazards and does not sufficiently increase the percentage of permanent cures.

"4. The cardinal advantage of the operation lies, first and above all, in the excision of an extensive cuff of vagina and the widest possible removal of the parametrial tissue.

"5. There is no middle-of-the-road policy in cancer of the cervix. The surgeon would better perform a simple vaginal hysterectomy or a high amputation of the cervix with extensive cauterization than to attempt the radical operation if he is not prepared effectively to execute its details.

"6. The earnest endeavor, by many specialists, with the improved ultimate cures in a few hands, offers the hope that a further simplification and perfection of details in this operation may yet make it more generally available."

The therapeutic problem involved in the successful treatment of carcinoma of the cervix is based upon the stage of invasion of the new growth. The results of the radical operation have proved conclusively that, with very rare exceptions, the hopeless cases are those of the metastatic type. All the methods now being employed are, therefore, directed toward the radical elimination of the local cervical and vaginal disease process. If the growth has invaded the parametrium to a point beyond the outer limits of the ureters, or if it has found lodgment in the iliac glands, the case must,

with rare exception, be regarded as hopeless, so far as surgical extirpation is concerned. This statement may be challenged, but in that case the burden of proof falls upon the challenger. No operation as yet suggested has been more generally misapplied than has the so-called radical abdominal operation. This may be proved to one's own satisfaction by examining the specimen exhibited, as a rule, as the product of this operation. This criticism is directed not alone to the work of other surgeons but applies with equal force to my own. There can be no more difficult surgical procedure than the radical operation for the removal of a cancerous uterus, for the efforts of the operator are impeded on all sides by insuperable limitations.

To attempt to compare the statistics of the various operators is a difficult or impossible task. In one clinic the greatest risks are taken, and an attempt is made to operate on hopeless cases in the belief that a dangerous hazard is always warranted, because thus an occasional brand may be snatched from the burning. Conversely, another surgeon, with less temerity, and possibly with better judgment, will operate only on cases that promise to reward his efforts and that are unmistakably within his surgical domain. The latter operator will, therefore, have fewer cases than the former, and, of course, his series will show a correspondingly higher rate of permanent cures. Then, too, the variation in skill of different surgeons plays an important role in the estimate of results. Because this skill varies so widely, and is so largely dependent upon the temperament and physical equipment of the surgeon, the standardization of the radical operation for cancer, whose degree of effectiveness is defined within the widest anatomic limits under the most hazardous of surgical liabilities, must remain forever upon shifting sands. In many operations the limited nature of the disease and its accessibility are such that more or less fixed principles of procedure may be evolved, and in these cases skill and judgment do not influence the operative results so profoundly.

In the anatomic division of cancer of the uterus this point may well be demonstrated, for in carcinoma of the fundus the statistics of various surgeons do not differ to any marked degree, because extirpation of the uterus generally suffices to give good results. So long as the growth is confined to the fundus, recurrence does not take place in more than 50 per cent. of cases, provided even a simple hysterectomy is performed. The rule, therefore, that calls for removal of the uterus and its adnexæ may, in the hands of a mediocre operator, be productive of a mortality incidence and a permanent percentage of cures approaching closely those of his more skilled colleague.

We are all fairly well satisfied with the results of operation in cancer of the fundus, whereas no one regards the operative treatment of cancer of the cervix with any great degree of optimism. To attain a higher measure of success, some more efficient means than the scalpel must be employed. That this remedy has not as yet been discovered is shown by the fact that almost every surgeon who has made a special study of this question very properly advocates the same principle here as has been adopted in cancer of every other part of the body that is accessible to radical surgical measures. Notwithstanding the remarkably good results that have followed the use of radium, I still adhere to the dictum that the uterus and all possible adjacent tissue, if the growth is very limited in its extent, must be extirpated. Beyond this point, however, I have grown quite conservative. My first recession occurred eighteen years ago, after visiting Sänger's Clinic. I found that this very clever surgeon and clear thinker had even then abandoned hysterectomy as a palliative measure in widely extended cancer, on the ground that practically no hope of cure could be offered the patient, and that removal of the uterus actually intensified her subsequent suffering. Following a hysterectomy, if carcinomatous tissue is left in the parametrium, the patient's postoperative state is likely

to be worse so far as pain is concerned, for it is usually severer and, therefore, more prolonged than if the uterus is allowed to remain *in situ*. With the removal of the uterus, the elastic broad ligaments and parametrium retract and cling closely to the pelvic wall, coming in contact with the large pelvic bloodvessels and the sacral plexus. If the growth remains in this situation the condition is infinitely more painful than if it is held in suspension away from the pelvic wall by the broad ligaments, and, therefore, more slowly reaches the periosteum and ganglionic roots.

The crux of the situation, therefore, as our experience has taught, is to attempt surgical measures only in the clearly operable cases, leaving the large remainder to secure relief from therapeutic efforts, which give as good or, as we now believe, even far better results from the use of radium.

In the inoperable cases, I believe the Percy cautery holds out a distinct hope; nevertheless, I do not share the great degree of optimism by the inventor of this method as regards the cases of wide-spread extension. In using the cautery, as in performing the radical operation, the anatomic barriers are the same, and I am firmly convinced that its general adoption will be followed by even a larger number of serious and wretchedly disabling sequelæ, so far as the rectum, bladder, and ureters are concerned. This cautery should be used only by the skilled specialist, for it is not safe in the hands of the novice. Even in skilled hands accidents are prone to occur in many instances. Moreover, one cannot get away from the fact that the Percy method is most radical, involving an abdominal section, ligation of the internal iliac arteries—a procedure that may be quite difficult in some cases—and the prolonged exposure of the patient to the slow desiccation of the tissues. This method must, therefore, be regarded as on trial, and it is to be hoped that its enthusiastic sponsor will publish a full account of cases up to date. We should know the mortality percentage and the degree of

morbidity following the operation in order fairly to estimate its full value. Because of the fact that a sufficient quantity of radium was at our disposal at The University Hospital we have followed this line of treatment almost exclusively, and we have had, therefore, but a limited experience with the desiccating method.

Under the best of clinical conditions, we are forced to throw into the surgical discard by far the largest proportion of cancer cases registered in our clinics. If we are still holding a very conservative opinion as to the final results following the Percy method, what, it may be asked, is our attitude toward the Roentgen-ray treatment and the use of radioactive substances?

In this country the *x*-ray has not had sufficient trial to give it a place of even tentative value. To Bumm's Clinic, from which very favorable preliminary reports were issued, we looked for an elaboration of technic that would serve as a standard for comparison with radium and mesothorium. The Great War has, however, put an end to all investigation in the gynecologic clinics of Germany, and it is only from the hospitals of the continent, where there is an abundance of material and also a willingness to risk much, so far as individual patients are concerned, to work out a theoretic principle, that we may expect authentic reports of hazardous novel procedures. The rœntgenologist cannot be depended upon for convincing reports, for his cases are drawn from widely divergent sources, and too often the clinical diagnosis is accepted and no microscopic control attempted.

As to radium, I am convinced that it offers the most helpful outlook of any remedy thus far presented in the palliative and even the curative treatment of the border-line and inoperable cases. In the Gynecologic Clinic of the University of Pennsylvania during the past two years 44 cases of carcinoma of the uterus, vagina, and urethra have been so treated. Practically all of these would, according to our past stand-

ards, have been classed as inoperable and, therefore, would inevitably have been doomed. The amount of radium used has varied slightly in different cases. Up to the present time we have adopted a tentative rule of applying from 85 to 100 mgs. in a platinum capsule shielded by rubber for twenty-four hours, repeating this at the end of six weeks.

As regards the effect of radium when applied in too large amounts and too often, Schauta's experience is enlightening: In his first series of 13 patients, from 50 to 100 mgs. of radium were applied uninterruptedly for from three to eleven days, and repeated in similar dosage after an interval of from twelve to twenty-two days. His results were most disastrous: one patient died of pyonephrosis; 8 showed steady loss of weight, with diarrhea, tenesmus, fever, vomiting, headache, and reduction in blood count. The autopsy findings showed severe necrosis and fistulæ with diphtheritic and purulent inflammations of the rectum and bladder, sigmoiditis, and ulcerative processes in the pelvic coils of the ileum. *One striking point, however, noted at the autopsies was that in not a single instance was a trace of local carcinoma found.* In the method of its application, however, the remedy proved far worse than the disease, but this investigator established beyond question that the radium emanations were absolutely destructive to cancer-cells.

In a second series of 11 cases the dosage was smaller and the interval of application shorter, but in spite of this some of the patients presented the group of disagreeable symptoms just noted; in 4 a local cure was effected.

In his third series of cases the dosage was regulated as follows: From 30 to 50 mgs. of radium, filtered through 1.1 mm. of gold, 1 mm. of platinum, and 0.75 mm. of brass, were applied in from five to eight exposures of twelve hours each at intervals of from one to several days; an interval of rest of three to four weeks was then allowed to elapse, followed by a second but shorter exposure, and in some cases, after

another interval of two to three weeks, a third series of applications were employed.

Eleven patients were thus treated; of these, 3 were somewhat improved and the remaining 8 were apparently cured. In no instance were fistulæ or necrosis produced, and the weight and general condition of the patient showed marked improvement.

As an evidence of the wide-spread skepticism concerning these newer remedies, and in spite of this very favorable personal experience, Schauta declares that, although he will use radium in advanced cases, he will still continue to employ Schuchart's method in the clearly operable cases, reserving radium as a postoperative prophylactic agent.

With a less intensive method than that at first employed by Schauta, we have thus far had but one patient in whom a fistula developed; this followed a radical operation in which 50 milligrams of radium were left within the vaginal cuff for eight hours, another application being made in six weeks. In this case there was no apparent retardation of the growth; on the contrary, within two months great sloughing holes appeared in the rectum and bladder. Whether these were caused by the radium or were due to the rapid growth of the carcinoma we were unable to determine. In practically every case radium has been applied for twenty-four hours, and the patient has usually returned home the next day. So far as any immediate effect is concerned, in no instance have we witnessed any untoward symptom beyond a fleeting degree of nausea, and this but rarely; only in one case did a high temperature develop, and this was in a case in which the Percy cautery had been applied extensively, and was followed by a twenty-four hour application of radium. In our series of cases there have been, with these two exceptions, no disagreeable effects. Fortunately, we have not had to pass through the experimental stage of this treatment but have profited by the mistakes of the early workers. Thus far we have

found an 85 to 100 milligram dosage quite satisfactory. It is possible that still better results may be achieved by larger amounts. For information on this score we must, however, turn to Drs. Kelly and Burnam.

We have adhered strictly to one rule, namely, never to attempt an operation on any case that has been healed locally by radium. It appears to us a most unwise surgical policy to subject a patient to the grave hazards of a radical operation, after the radium has acted beneficially, in a fatuous attempt to secure still more effective results. With further experience we may modify this rule, but up to the present we have not seen the slightest evidence in favor of so apparently unwise a policy.

Radium, as is shown in our series of cases, is by no means a universal panacea for cancer, even when the growth is strictly localized. There is no way of determining which cases will be benefited by its use. There is beyond doubt a certain percentage—how small or how great we cannot tell from our experience—in which cancerous growths are not retarded by radiotherapy; indeed, occasionally it would appear that there is a positive acceleration of growth. That many cases show an astounding improvement and local cure cannot be gainsaid. In our series several instances occurred in which the results achieved were so remarkable as to be almost incredible. Whether in these cases the fire is but smouldering and may break out sooner or later with renewed violence time alone will tell.

In the discussion of these cases the question of hospital economics must not be lost sight of. The length of stay in the hospital following a radical operation will average at least three weeks; whereas after the application of radium not more than three days will be required. When complications arise after radical operations they are usually serious, entailing much suffering. Such patients, on returning home, are likely to remain semi-invalids for several weeks, and

when, as is frequently the case, there is a rapid continuation of the disease, they become a heavy burden to a poor family. In the comparison of statistics, this difference between the two classes of patients is greatly in favor of those treated by radium, a fact that tends to incline us strongly to the use of radium in border-line cases, which we formerly subjected to a radical operation.

It would also appear to be a self-evident fact that the postoperative effects of the Percy method must fall far short of those of the radium cases. I cannot here enter into a discussion of ultimate curative results for we are on the very threshhold of a therapeutic innovation that may, in the end, prove of less value in effecting a cure than the radical method of performing a hysterectomy.

Removal of the uterus in cases of cancer of the fundus has yielded such good results that I do not feel we are justified in taking any chances with radium, not even in the border-line cases. *Our attitude toward the cervical and fundal growths is diametrically opposite. In border-line cases of cancer of the cervex we employ radium. In doubtful cases of cancer of the fundus we invariably perform a hysterectomy.* A pessimistic view dominates our outlook in the surgical treatment of the cervical growths if the pathologic process is at all advanced, whereas fundal growths may be viewed with a cheerful optimism even when the cancerous process is extensive. As a palliative agent, we may assert with full assurance that we have never obtained results with any other method that have even approached in beneficence those secured by radium. The cloud, however, that hangs over the remedy is the danger of unbridled optimism.

The following three tables are appended as they give the final results in the radical operation for cancer of the cervix, the simple operation for cancer of the fundus and the palliative results in cases treated by radium during the last two

years. A very close oversight is being kept of the radium cases, and we expect from time to time to give final reports on all of these cases:

THE RADICAL OPERATION FOR CARCINOMA OF CERVIX

Total number of cases	53
Operative deaths (peritonitis)	5
Died from continuance in three months	1
Died from continuance in six months	3
Died from continuance in ten months	1
Died from continuance in eleven months	1
Died from continuance in twelve months	3
Died from continuance in fifteen months	1
Died from continuance in sixteen months	1
Died from continuance in eighteen months	5
Died from continuance in two years	6
Unable to trace	10
Alive and no sign of continuance:	
One year	2
One and one-half years	3
Three years	0
Four years	2
Five years	1
Six years	6
Seven years	1
Eight years	1
Total	53

POST-OPERATIVE SEQUELÆ

Suppuration of abdominal incision	8
Cystitis	4
Peritonitis (recovery)	3
Ureteral fistulæ	2
Vesical fistulæ	5
Phlebitis	1
Laceration of rectum (fistula)	1
Pleurisy	2
Rectovaginal fistula	2

Average stay in hospital, twenty-one days at least

PANHYSTERECTOMY FOR CARCINOMA OF FUNDUS

Total number of cases	26
Operative deaths (one patient died one week after operation from a general metastasis of chorio-epithelioma. Death occurred from widespread involvement of the lungs with the malignant process. Other patient died from peritonitis)	2
Well over six years	5
Well over five years	1
Well over four years	1
Well over three and one-half years	2
Well over two and three-fourths years	2
Well over two years	2
Well over one year	1
Died from continuance of disease in three months	1
Died from continuance of disease in seven months	1
Died from continuance of disease in one year	1
Died from continuance of disease in three years	1
Died from continuance of disease in five years	2
Died in two and one-half years from mastoid abscess (complete autopsy revealed no microscopic trace of cancer either in pelvis or in the abdominal lymph glands)	1
Unable to trace	3

USE OF RADIUM IN INOPERABLE CANCER OF CERVIX, VAGINA, AND URETHRA[1]

Deaths following treatment	0
Died from continuance in one month	4
Died from continuance in two months	1
Died from continuance in three months	1
Died from continuance in four months	1
Died from continuance in six months	1
Died from continuance in seven months	1
Died from continuance in eight months	1
Died from continuance in nine months	1
Died from continuance in ten months	1
Died from continuance in eleven months	1
Alive twenty-two months	2
Alive twenty-one months	1
Alive sixteen months	1
Alive fourteen months	1
Carried forward	18

[1] This table is a complete record of cases treated by radium up to the time of this paper going to print, September 15, 1916.

USE OF RADIUM IN INOPERABLE CANCER OF CERVIX, VAGINA, AND URETHRA (CONTINUED)

Brought forward	18
Alive twelve months	2
Alive eleven months	1
Alive ten months	1
Alive nine months	2
Alive seven months	5
Alive six months	2
Alive five months	1
Alive four months	5
Alive three months	4
Alive two months	16
Alive one month	4
Not traced	6
Total number of cases	67

HISTORY OF PATIENT AFTER APPLICATION OF RADIUM

Relief of hemorrhage (complete)	34
Recurrence of hemorrhage in three weeks	1
Recurrence of hemorrhage in four weeks	1
Recurrence of hemorrhage in six weeks	1
Recurrence of hemorrhage in two months	1
Recurrence of hemorrhage in three months	1
Recurrence of hemorrhage in four months	2
Recurrence of hemorrhage in eight months	1
Relief of pain (complete)	2
Relief of pain for two months	1
No relief of pain	18
No symptomatic relief	12
Local healing of ulcerative area (of this number 2 died subsequently of internal metastasis)	26
Rapid extension of growth, coincident vesicovaginal and recto-vaginal fistula	5
Immedite untoward result	0

Average stay in hospital about three days.

THE EXTENDED OPERATION FOR CARCINOMA OF THE UTERUS

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Four years ago it was my privilege to take part in the symposium on uterine cancer at the Baltimore meeting of this Society. In that paper I said that while I believed in the radical abdominal operation, greater experience had not made me any more confident that its primary or ultimate results would be favorable to the next patient operated upon. I have had no reason to change this opinion during the past four years. Unfortunately added experience has strengthened my belief that the extended operation for cancer of the uterus is exceedingly dangerous, always attended by a high primary mortality and that it is no operation for inexperienced hands. However, it must be continually kept in mind that in spite of these defects, today it is the only method, unless it be the extended vaginal method, which holds out to the patient with carcinoma of the uterus a reasonable hope of complete cure. I make this statement in advance of what will be revealed by the other essayists as to the results of radium or other methods of treatment. No one will be more glad to discard the radical abdominal method than will I, if I can be shown that more patients can be ultimately cured by less dangerous methods.

To arrive at any just conclusion regarding the radical operation it is absolutely necessary that the primary and

ultimate results be considered together. Every one who has performed the operation realizes how easy it is to dodge the issue and perform what Clark has well called makeshift operations. What is easier than to avoid going beyond a mass in one or the other broad ligament in which the ureter is embedded and tying the uterine artery close to the uterus as in the ordinary panhysterectomy? Choosing the easiest way may save the operator a primary death, but it just as surely dooms the patient to a continuance of the disease and ultimate death, as did the old vaginal hysteretomy. Such an operation is not an extended operation for cancer of the uterus and should not be classified as such. If it be not excluded it will show in the final summing up, for if the patients be kept track of, they will be found to have died of so-called recurrences which in reality were no recurrences at all since the disease was not removed.

I would not be understood as asserting that an operator has not a perfect right to dodge the issue and save his patient primarily when he feels that a prolongation of the operation means but one thing—death. However, I do insist that such operations should not be classed among the extended operations for carcinoma of the uterus, for if so included they give a false conception of the primary mortality. In fact, it is not enough to state that such and such operations were radical. If they be radical it will be demonstrated in the ultimate results—the number of patients surviving five years or more. If these results be favorable then and only then will we be convinced that the operations were indeed radical.

Looked at another way, the burden of proof is upon the radical abdominal operator to show, if his ultimate results are poor, why he chose the abdominal in preference to the safer vaginal route as a palliative procedure. Because it is a palliative method if it cannot be shown that quite a percentage of patients be alive and well after five years. We may or may not know at the completion of a certain radical opera-

tion whether it has accomplished its purpose. If macroscopic cancerous areas have been left behind, it should be stated in any classification of radical operations for cancer of the uterus that in so many cases the operations were performed, while in other cases although the radical operation was attempted, it had to be abandoned on account of an extension of the disease not realized when the operation was begun.

It is different with microscopic areas of cancer. Here it is perfectly justifiable for the operator to conclude that he has performed the radical operation, if the principles of the technic, such as ligation of the uterine arteries external to the ureters and removal of a long cuff of vaginal tissue below the cervical cancer, be carried out. In reality, excluding implantation metastases, an avoidable error of technic, every "recurrence" after a radical abdominal operation for cancer of the uterus is evidence that the operator did not accomplish his purpose although he may have been justified in thinking at the time of the operation that he had.

Primary Results. As in the former paper I shall still include cancer of the fundus cases with those of the cervix, for both classes of cases have been subjected to the radical abdominal operation. However, in order that the operative results may be compared with others, the primary and end results of carcinoma of the fundus and of the cervix have been considered separately. Since the 1912 meeting I have not employed the extended operation upon a single case of carcinoma of the fundus but have depended upon the ordinary panhysterectomy. Since 1912 there have been 14 cases of ordinary hysterectomy for carcinoma of the fundus with 2 primary deaths or a primary mortality of 14 per cent. There has been two recurrences.

This is a worse showing than in the former report where there were 11 radical operations for carcinoma of the fundus with one operative death or a primary mortality of 9 per cent., and only one recurrence in the remaining 10 cases.

It confirms the position of Weibel who bases his conclusions upon 67 cases of carcinoma of the fundus from Wertheim's Clinic. These cases were operated upon by different methods, radical abdominal, simple abdominal panhysterectomies, supravaginal amputations, and vaginal hysterectomies. While the radical abdominal method was attended by the highest primary mortality, it also showed the highest percentage of ultimate recoveries, notwithstanding this method was employed in only the most advanced cases. In 31 cases the regional lymph glands were found to be involved five times or in 16 per cent.

The only recurrence in 10 cases of cancer of the fundus surviving the radical operation reported in my last series occurred in a patient whose regional lymph glands showed carcinoma. Just because our results are better in carcinoma of the fundus after ordinary panhysterectomy should not blind us to the fact that only by the very radical operation can the individual patient be given the best chance of a nonrecurrence. There has been but a single recurrence in 10 patients surviving the radical abdominal operation for cancer of the fundus, although these patients are all beyond the five-year limit. Hereafter, I shall perform the radical operation upon all operable cancers of the fundus.

I had reason to think that greater experience with the operation under discussion, carrying with it necessarily a reduction in the time required to complete the operative procedure, would lower the primary mortality in my hands. This expectation was further justified by my results since there were only 4 deaths in the last 37 cases in the last series or a mortality of 10.8 per cent. But my hopes were doomed to disappointment since the mortality has been increased from 22.5 per cent. to 25.4 per cent., there being 15 deaths in a total of 59 cases.

It is rather a thankless task to attempt to explain these latest deaths, three of which resulted from shock and two

from peritonitis. The same technic was employed as with the previous cases, but with far worse results. I had thought it possible to judge with a fair degree of precision whether the cancerous process had advanced beyond the point where it was fairly safe to attempt the radical removal of the uterus, especially if the final decision was reserved until after the abdomen was opened. But I judged incorrectly in these cases since three patients died of shock, the result of prolongation of the operation for a time sufficient to overcome the difficulties met with. The two patients dying from peritonitis should have been saved but were not in spite of all precautions to avoid sepsis.

It must be constantly borne in mind that every case of cancer of the uterus must be studied as an individual problem, so far as surgical treatment is concerned. First of all is the disease so far advanced as to preclude any hope that the patient can be cured by radical operation? Long ago it was determined that while much could be learned of the extent of the disease through careful vaginal and rectal palpation, the final decision had to be made after the abdomen was opened. Only in this way is it possible to determine definitely the nature of induration to the sides of the uterus, whether due to cancer or to pelvic inflammation.

If the parametric be involved by cancer well outside of the uterus, it must be decided from the extent of the involvement and the other factors in the case whether to attempt the removal of the carcinoma radically or employ some palliative procedure. The other factors in the case are the age of the patient, not in years always but the actual age as revealed by the condition of the kidneys, the heart and the bloodvessels. Cancer patients do not stand prolonged operations well; especially is this true when the uterus is the seat of the cancer. This is easily demonstrated when such patients are compared with women of the same age who have had to undergo prolonged operations for other conditions. In other

words, the cancer of the uterus patient is a poor risk at best. Where the kidneys and vascular system are impaired it may be folly to subject her to such a serious operation, because of the slight chance of her primary recovery. It may be far better for the patient to prolong her life as much as possible by palliative measures.

Using our best judgment we may and do make mistakes, attempt the impossible with the result that the patient does not recover primarily. But it is the height of folly in my opinion to speak continually as if the entire question of primary mortality after the radical operation for carcinoma of the uterus depended solely upon the extent of the disease. As a matter of fact that is only one of the factors in the problem, the other being nearly if not just as important.

The responsibility of what the patient will decide rests after all with the surgeon. The victim of cancer of the uterus above everything else wants to be cured, not only primarily but so that there will be no return of the disease. She may be willing to take a great risk if there be a fair chance of being cured, but not one woman in fifty but will choose palliative measures and the prolongation of life, rather than an almost hopeless operation so far as primary results are concerned. It is hardly fair for the surgeon to justify his course of taking large chances with the life of an individual cancer of the uterus patient, by saying that inasmuch as without an operation she is doomed to a horrible death, consequently any operative procedure is justifiable. By so reasoning he is not respecting the rights of the patient whose wishes, not the surgeon's, should be paramount.

Operability. I am in no position to speak regarding the operability of the cancer cases seen by me since May, 1912, since I have been trying out the various methods of cauterization and have not used the radical operation for cancer of the fundus when it could have been employed. During the past four years I have seen in my University and private

clinic 124 cases of cancer of the uterus, 107 cases of cancer of the cervix, and 17 cases of cancer of the fundus (Table III).

Unquestionably some of the cancer of the cervix cases could have been subjected to the radical operation, just how many I am unable to say, but I was anxious to give the cautery treatment a fair trial not only in the so-called inoperable cases, far advanced cases, but those in the doubtful class as regards choice of operation. Again 36 patients were so far advanced that nothing could be done or else they refused operation.

I was most unfortunate in my selection of cases for the radical operation as shown by my results and the discouragement that followed, undoubtedly influenced me in the choice of cautery methods. However, my experience with the cautery has not convinced me that it is in the slightest degree curative. On the contrary, I believe that the method must be reserved for those cases of cancer of the uterus where palliative measures only are indicated or where it may be serviceable in preparing a cancerous cervix for radical removal.

I have already spoken of my experience with panhysterectomy for fundus carcinoma and my determination to employ the radical operation in the future for this class of cases.

With the exception of these comparatively few cases where the radical operation might have been or was employed, the very large proportion of the cases of uterine cancer were inoperable from the standpoint of a possible cure. They were far advanced cases, even more, if I am any judge, than the previous 125 cases which came under my observation. This is not very encouraging so far as the results of our campaign against cancer are concerned but it furnishes convincing proof of the need of such a propaganda.

End Results. I am able at this time to report the end results of the 51 cases of cancer of the cervix and fundus since

the patients have all been operated upon five years. I am aware that percentages based upon such a small number of cases have only a relative value when compared with percentages of other operators based upon a large number of cases. As a matter of fact, however, we must employ the percentage method, if we are to compare results both large and small. Still it is best to keep in mind that percentages, favorable or unfavorable, in a small series of cases do not tell the whole story.

In Table IV have been recorded the end results in 51 cases of cancer of the cervix and fundus combined, since the radical operation was performed for both classes of cancer. Naturally, the end results will be better than when cancer of the cervix is considered alone since there is less tendency for carcinoma situated in the fundus to recur. I might again emphasize the point that this is true if the radical operation has been employed, the reverse being the case if ordinary panhysterectomy has been done.

In the 41 patients surviving the radical operation there were 12 recurrences, 2 died of intercurrent diseases, 1 tuberculosis and the other heart disease. There were 27 patients alive and well five years or more after the radical abdominal operation.

In order that there be no misunderstanding regarding the method of arriving at end results in this and the other tables, it may be well to state that every patient was located and her condition ascertained for this report. In other words, just because a patient with cancer of the uterus operated radically had passed the five-year limit at the last report four years ago, it was not assumed she was well today. Her condition was ascertained by a letter from the patient herself or from her physician. Fortunately I am in a position to keep track of these cancer cases and have been able to secure the postoperative history of each patient.

Wertheim's rules for working out the statistics of the end

results for cancer patients subjected to the radical operation have been followed in the tables because they are the simplest. All patients who die from intercurrent disease or who are lost track of, must be subtracted from the total number of operations to ascertain the percentage of permanent cures in all cases operated upon. To obtain the percentage of permanent cures of those surviving the operation, the number of patients living five years or more after the operation must be divided by those surviving the primary operations after deducting those dying of intercurrent diseases and the number lost track of.

The end results as shown in Table IV are surprisingly good and very encouraging. Five years or more after the operations, 56.2 per cent. of patients operated upon for cancer of the cervix and fundus are permanently cured, while 69.2 per cent. of those surviving the operations are well with no recurrence.

In order to forestall objections that the results were due to the inclusion of fundus with cancer of the cervix cases, the latter to the number of 40, the total number operated five years or more ago, have been arranged in Table V. The most interest centers around the number of patients alive and well after five years (18). Thus, 47.3 per cent. of the total number of patients with cancer of the cervix subjected to the radical abdominal method remain cured after five or more years, while 62 per cent. of those surviving the operation remain cured.

But better than percentages, better than anything else is the knowledge that 18 women out of 40 subjected to the radical operation for cancer of the cervix may be pronounced cured, since they have passed the five-year period without a recurrence. This compensates in part for a high primary mortality since very few if any of these women would be alive today had other methods of cure been attempted.

There has been no further recurrence in the 11 patients

with cancer of the fundus mentioned in the last report (Table VI). Of these 1 died from the operation and 1 from a recurrence one year after the operation. The remaining 9 patients are alive and well from five to twelve years after the operations. It has been considered inadvisable to figure the percentage of cures in such a small series of cases.

The time elapsed since the radical operations has been recorded in Table VII. Six patients have gone five years, 5 patients six years, 7 patients seven years, 3 patients eight years, 2 nine years, 2 twelve years and 1 patient eleven and thirteen years respectively. While it is impossible to state positively there will be no further recurrences in this series of patients who have passed the five-year limit, we have every reason to believe that such will be the case in most instances. However, it is interesting to note that one of the recurrences and deaths occurred in a patient who had been apparently free from the disease for five and a half years after the radical operation for cancer of the cervix.

It may be stated that the patient mentioned in the last report as having had a recurrence in the vaginal cicatrix five months after the operation with no recurrence for two years, subsequently died of the disease.

Summary and Conclusions. 1. Further experience with the radical abdominal operation for cancer of the uterus confirms the belief that it is an exceedingly dangerous procedure and will always be attended by a high primary mortality.

2. Even if the percentage of operability of cases of cancer of the uterus markedly increases in this country and elsewhere there will always be border-line cases attended by a high primary mortality.

3. This is true because it is not always possible even with the greatest care in examination of the patient prior to operation to estimate the extent of the disease.

4. Errors in judgment mean death from shock if the disease

be too far advanced or failure to complete the radical removal of the cancerous uterus.

5. However, in spite of a high primary mortality it is the only procedure with the possible exception of the extended vaginal operation which holds out any reasonable promise of a permanent cure.

6. Primary and end results of the radical operation for cancer of the uterus must be considered together in order to judge of the good accomplished in a given series of cases.

7. Unless the operations be radical the end results will be poor and if they be radical the primary mortality must be high.

8. If the end results be poor the burden of proof is upon the radical abdominal operator to show why he did not choose a much safer palliative procedure.

9. Since 1912, experience with 14 ordinary panhysterectomies for cancer of the fundus shows worse primary and end results than in 11 cases previously reported where radical removal was performed.

10. This showing and the results following removal of fundus carcinoma by various methods in the Wertheim Clinic as reported lead to the conclusion that, because carcinoma of the fundus is more easily cured than when the cervix is involved, we are not justified in thinking it can be treated any less radically than carcinoma of the cervix.

11. The primary mortality in 59 cases of cancer of the cervix and fundus treated by the radical abdominal operation was 25.4 per cent.

12. The extent of the involvement in cancer of the uterus can only be determined definitely after the abdomen has been opened. If the parametria are too much involved and the condition of the patient's kidneys, heart and bloodvessels warrant a prolonged and depressing operation it is justifiable to attempt the radical operation.

13. During the past four years 124 cases of cancer of the uterus have been seen in the University and private clinics. The disease was so far advanced in 36 cases that operation was refused or nothing was done. The cautery method was tried in 58 cases and proved valueless except as a palliative procedure.

14. In spite of attempts to educate the public regarding cancer, the cases of cancer of the uterus seen during the past four years were more advanced than has formerly been the case.

15. The end results in 51 patients operated upon five or more years ago were most gratifying. Combining fundus and cervix cases, 27 of the 51 patients were alive and well after five years or 56.2 per cent. of all cases operated upon, while 69.2 per cent. of all those surviving the operations were alive after five years.

16. Of 40 cases of cancer of the cervix, operated upon five years or more ago, 18 of those surviving the operations are alive and well today. Thus, 47.3 per cent. of the total number remain cured after five years, while 62 per cent. of those surviving the operation remain cured.

17. These percentages were obtained by Wertheim's formula where patients dying of intercurrent disease or those lost track of are subtracted from the total number of operative cases or from the number surviving.

18. The length of time elapsed since the operations upon the 18 patients who are alive and well vary from five up to thirteen years. There is every reason to think these patients are permanently cured although one patient did have a recurrence and die between five and six years after the radical operation.

19. In spite of the high primary mortality the end results in those surviving the operation encourage us to continue with the procedure in suitable cases.

TABLE I.—Radical Abdominal Operation for Cancer of the Uterus. Primary Mortality in 59 Cases—48 Cases of Cancer of the Cervix—11 Cases of Cancer of the Fundus.

JULY 1902 TO OCTOBER, 1915.

Total number of cases	59 cases
Total number of deaths	15 "
Total primary mortality	25.4 per cent.
Primary mortality, 48 cervix cases	29.1 "
Primary mortality, 11 fundus cases	9.0 "

TABLE II.—Causes of Primary Deaths—15 Cases.

Shock	7
Shock and hemorrhage	2
Peritonitis	4
Embolus	2
Total	15

TABLE III.—Cases of Cancer of the Uterus seen from May, 1912 to May, 1916.

Cancer of the cervix	107 cases
Cancer of fundus	17 "
	124 "
Inoperable cases or refused operation	31
Radical abdominal operation	8
Panhysterectomy for cancer of fundus	14
Cautery—opening abdomen	32
Cautery—without opening abdomen	39
Total	124

TABLE IV.—End Results of the Radical Abdominal Operation—51 Cases of Cancer of the Cervix and Fundus Operated upon at Least Five Years Ago.

Number of cases	51
Primary deaths	10
Number surviving	41
Number of recurrences	12
Died of intercurrent disease	2
Patients alive and well five years after operation	27
Percentage of permament cures of all cases operated upon (Wertheim's formula)	56.2 per cent.
Percentage of permanent cures of those surviving the operation (Wertheim's formula)	69.2 "

TABLE V.—End Results of the Radical Abdominal Operation for Cancer of the Cervix—40 Cases Operated upon at Least Five Years Ago.

Number of cases of cancer of the cervix	40
Primary deaths	9
Percentage of primary mortality	22.5
Number of patients with recurrences	11
Percentage of recurrences	35.4
Number dying of intercurrent diseases	2
Number of patients alive and well at least five years after operation	18
Permanent cure of all patients operated upon by radical method (Wertheim's formula)	47.3 per cent.
Permanent cure of patients surviving the operation (Wertheim's formula)	62.0 "

TABLE VI.—End Results of the Radical Abdominal Operation for Cancer of the Fundus—11 Cases Operated upon at Least Five Years Ago.

Number of cases of cancer of the fundus	11
Primary deaths	1
Percentage of primary mortality	11.1
Number of patients with recurrences	1
Percentage of recurrences	9.8
Number of patients alive and well at least five years after operation	9

TABLE VII.—Patients Alive at Present Time without Recurrence.

Length of time since operation.	Cervix.	Fundus.	Total.
13 years	1	0	1
12 "	1	1	2
11 "	0	1	1
9 "	1	1	2
8 "	2	1	3
7 "	6	1	7
6 "	5	0	5
5 "	2	4	6
3 "	1	0	1
1 "	1	0	1
			29
Number of cases five or more years after operation			27
Number of cases less than five years after operation			2

RADIUM THERAPY IN CANCER OF THE UTERUS

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I propose to put in evidence of the value of radium therapy in cancer of the uterus the personal experiences of myself and my colleagues, Drs. Curtis F. Burnam and Robert M. Lewis. We have applied radium and radium emanation locally in three hundred and twenty-seven cases (327) of cancer of the uterus up to date within the past seven years.

As I have not yet had an opportunity of presenting this most important matter before the Gynecological Society, which more than any other group in America, is vitally interested in the problem of cancer of the uterus, I will first deal briefly with the principles of the general problem of radium therapy in order to introduce the subject more clearly.

Radium therapy began in 1902 in the hands of Danlos, a skin specialist of Paris. The history of the more extended use of radium in its deeper fields in the body dates from 1907 (Domenici). The suggestion that it might be of service came from a radium burn experienced by Becquerel, who had carried some in his vest pocket for several hours. It was then found by clinical experimentation that cancer cells were often much more susceptible than the normal cells of the body, in other words that their vitality was less. In this statement lies the whole question of radiotherapy.

Laws Governing the Action of Radium on Cancer Cells. Radium gives off three forms of radiation called

alpha, beta and gamma rays. The alpha rays are gross particles of matter and are not used in gynecological work. I will state the methods of treatment with the beta and gamma rays in a didactic form under the caption of laws:

Law 1. The efficiency of an application depends upon the hard beta and the gamma rays, largely the gamma.

Law 2. The beta are less penetrating and more irritating than the gamma rays.

Law 3. The percentage relationship between beta and gamma rays can be regulated by the filtration of the rays through a metal screen. This fact was first fully appreciated by Domenici (1907), and is now fundamental in all radium therapeutic work.

Law 4. By filtration irritating rays are cut out, and it becomes safe to give prolonged treatment to tumors lying in the deeper tissues. The whole question of deep ray therapy hinges on this law.

Law 5. All living tissues are affected by radium radiations, but in varying degrees according to their susceptibility. The first effect is to stimulate the circulation, flushing the part with blood; then the tissues undergo fibrosis and the vessels show endarteritis and finally complete obliteration. The last stage in an over treatment is a peculiar whitish leathery slough which separates after weeks or months, leaving a slow-healing painful ulcer.

Law 6. The cancer cells are in many cases far more susceptible to radiation than the surrounding healthy cells. Herein lies the secret of success in radiating diseased tissues. He is most successful in his work who is most successful in carrying his dosage to the maximum without injuring the sound tissues, bearing in mind not only the immediate, but the late sequelæ as well.

Law 7. The intensity of the radiation at any given depth of the tissues is governed by the law which is common to all forces distributed from a central point equally in all

directions—the law of spherical dispersion, also known as the law of inverse squares; at a distance of 2 it is $\frac{1}{4}$ at a distance of 4 it is $\frac{1}{16}$ etc. It is evident from this that the further away from the surface one places the luminous point, the more one equalizes the dosage of the skin and the growth beneath it. For example if in treating a tumor under the skin the tube is laid directly upon the skin, the latter receives such an intense treatment that it is likely to be burned, but if the applicator is applied to a distance of two or even four inches the amount received by each is approximately equal.

Law 8. It is widely asserted that only those rays are effective which are absorbed in the tissues, and that the rays which pass through do no work.

The inconvenience of attacking the sound as well as the diseased tissues is also overcome in several ways, (*a*) by cross firing, that is to say, by making two applications at the same time from different directions (Wickham), or (*b*) by marking out areas on the skin for successive radiations, or (*c*) by radiating from opposite directions. In the uterus we can apply our treatment (*a*) from the vagina, (*b*) from within the cervix; (*c*) through the substance of the disease by plunging an emanation needle into the mass, (*d*) through the lower abdomen, and (*e*) through the back and lower sacrum. The rectum and bladder are rarely available as avenues as they are peculiarly irritable.

Let us consider briefly the sixth law, that the cancer cells of a part are often biologically less resistant to radium radiation than the standard normal cells of the part.

The gross manifest changes occurring in a cancer of the cervix after sufficient radiation are, a shrinkage of the affected area, a drying up of the secretions, and a disappearance of the odor, this continues until all trace of the disease has disappeared and the cervix often utterly indistinguishable at first, is sometimes perfectly restored and appears normal, if sclerotic.

A startling improvement may take place after a single radiation, but the rapidity of the resolution is variable, in one patient improvement is evident in a few days or a week, while in another it may extend over a period of six or eight weeks, or longer. It is manifest that this question of response has much to do with the question as to how often, and with what dosage a given case should be treated. As the local condition changes for the better there is also a noticeable improvement in the subjective symptoms and in the general condition. Pain often goes quickly, appetite improves, the patient improves in color, gains rapidly in weight and acquires her zest of living, and resumes once more her normal interests in life.

Sometimes there is nausea and vomiting, headache, some abdominal pain, some fever, and malaise lasting for a few days; we have never seen any serious primary results from a treatment.

Microscopic Changes: The microscopic changes in the tissues are striking and unlike anything ever seen before.

A first study of radiated tissues is apt to make the following impression:

(*a*) If a piece of cancerous tissue is examined about a week after radiation, one sees an extensive hyaline degeneration of the cells and nuclei with a beginning disappearance of the cells.

(*b*) Several weeks later an astounding change is seen in that all the affected areas are replaced by a new formed vascular fibrous tissue, with thick-walled capillaries.

A more careful systematic study of the tissues made from day to day shows that the changes pursue the following order:

(*a*) Dilatation of the bloodvessels developing an erythroedema.

(*b*) An exudation containing an immense number of eosinophilic granular cells, many of which are polymorphonuclear leukocytes.

(*c*) A little later we observe changes in the nuclei of the cancer cells, the nucleus swells, and the chromatin is irregularly dispersed through it in granules. The nucleus then bursts (Karyorhexis) and the chromatin escapes into the cell in irregular droplets. Later there are masses of chromatin grouped in irregular lakes, in the tissue, the protoplasm of the cells becomes hazy, and finally hyaline; the whole process is therefore one of cytolysis or cell death.

(*d*) As the cancer cells disappear, provided the radiation has not been too intense, there is a multiplication of the fibrous tissue cells which replace and restore the contour of the part.

The above description assumes a normal dosage of radiation; if the dose is excessive all the cells of the part are destroyed alike and a slough and a painful slow healing ulcer with dense fibrous tissue, are the result.

Types of Cancer of Uterus and Vagina with Reference to Radiation. We have to consider the three common types of cancer of the uterus with reference to the effects of radiation—namely the squamous, and the basal celled type affecting cervix and vagina, and the two types of adenocarcinoma as they affect the body and the upper cervix, not to mention transition stages, and such conditions as primary sarcoma of the cervix of which we have seen several cases. While the histological differences in these types are well established, any response to radiation, by which we can differentiate our cases and prophesy results, are not so clear. In the first place, all cancers do not respond equally to radiation, some even go on growing lustily in spite of any safe dosage that can be given. In general it may be said that the basal celled growths are somewhat more amenable to treatment.

Cure. The word "cure" can now be used unhesitatingly in speaking of the results of radiation as there are many

cases recorded which have passed over a three and five-year limit. My first hospital case was treated with radium in March 1908, a recurrent cancer of the vault extending back into the posterior pelvis, and is well today. Within, however, the limit of two or three years or even longer there is a possibility of a recrudescence, and in such cases "cure" means only apparent complete destruction of the disease. All cases ought to be watched and examined at frequent intervals for years.

How to Radiate. There are five avenues of approach:—

1. Through the vagina,
2. Through the cervix,
3. By introducing the radium directly into the affected tissues,
4. Through the abdomen,
5. Through the sacrum.

The best plan is often not to use one, but two or more of these avenues, combining inside with outside treatments.

We have found that large doses are more efficient and more convenient and use amounts varying from five hundred to two or three thousand milligrams of radium metal, or the equivalent in emanation. The radium salt is inserted in silver capsules 2 to 3 mm. thick, covered with rubber of equal thickness. In a vaginal treatment several hundred milligrams are applied against the growth or pushed up into it, while the rectum is protected by a screen of at least 6 mm. of gold, made of from two to four twenty dollar gold pieces (Burnam's filter). This obviates the irritation of the bowel so often noted in earlier cases. The duration extends over a period varying from one to eight hours depending upon local condition. With the filter described we have even been able to radiate with a gram and a half of radium element, for eight consecutive hours in one position, without causing rectal irritation. After a thorough radiation there ought to be an interval of from three to eight

weeks or longer before a second treatment through the same avenue.

The patient should remain under immediate observation for two months, being examined at from seven to ten day intervals. Those who live nearby sometimes go home at once to be watched by the family physician and to return in six or eight weeks.

Our total number of cases of advanced cancer of the vagina and uterus up to the middle of April 1916, has been three hundred and twenty-seven (327). These with few exceptions were utterly inoperable primary, or inoperable recurrent cases. I have included a few operable cases (4) where radium alone was used. In a few inoperable cases, I use radium to reduce the growth and mobilization of the uterus, and then operated. Sixty-nine (69) of the three hundred and twenty-seven (327), cases appear to have been cured.

1 case over seven years, a recurrent cervical cancer at the vaginal vault.

1 case over five years.

6 cases over six years.

3 cases over three years.

19 cases over two years.

22 cases over one year.

17 cases less than one year.

In this list of 327 cases there is not included a single case of cancer of the corpus uteri as we do not believe in abandoning the surgical treatment in a field where it has yielded such splendid results.

We have about five uteri where curettage has shown adenocarcinoma of the body and where radium has been applied in utero by ourselves or other followed after a few weeks by total hysterectomy. In several of these no cancer whatever could be found in any microscopic sections made. In some enormous recurrent cancers choking the pelvis and bulging into the lower abdomen, following hysterectomy for

cancer of the body or primary and inoperable and spreading from the body, radiation has brought about marvelous changes and the utmost benefit short of a cure.

Among the uncured are many which were hopeless from the outset from general metastases or huge local involvement with matastases. Taking all the cases as they have come to us we have been able to give permanent relief so far to something better than one in five, not to mention the marked local and general improvement in most of the others, which however did not persist.

In one the condition was as follows, a pelvis choked with hard masses, without vaginal ulceration or discharge. These masses could be felt easily also through *the bowel*. There were also metastatic conglomerate glands behind the transverse colon, and fluid in the abdomen with signs of intestinal obstruction. Everything cleared up under repeated massive radiations and symptomatically the patient was well, going about and engaged in all her usual activities. She was thus kept alive for eighteen months, except for the last few months *in* comfort. These experiences clearly show what has been demonstrated abroad that body cancers are peculiarly susceptible.

Kronig seems to regard them as the best field for radiation.

In addition to the 327 cases just cited we have had 20 others which were good operative risks and were radiated subsequent to a thorough surgical extirpation. Of these 20, 2 are well over four years, 1 is well over three years, 4 are well over two years, 3 are well over eighteen months, 10 are well within eighteen months.

We have seen no recurrence as yet in any of this group. I feel sure that under a purely operative plan of treatment a considerable percentage would have recurred within a year.

In conclusion our experiences may be formulated as follows:

The earlier the case is treated the better are the results of radiation. This rule applies to those which are radiated and not operated upon as well as to those which are radiated subsequent to operation. We are as yet unwilling to take Doderlein's stand that radium should supersede operation in this class of the early and operable cases. Radium alone will undoubtedly yield a higher percentage of permanent cures than operation alone in the very best hands. There are certain cancers both basal celled and squamous in the cervix, as well as on the skin surface, where for reasons as yet unknown radium does not cure. The radical operation avoids taking this chance.

Furthermore in favor of operation in early cases, subsequent to operation we can radiate the tissues and destroy any lingering cancer cells just as effectively as could have been done before operation through the cervix. The serious objection to radiating a cervix and watching is the difficulty of being assured that all the cancer has been destroyed.

Sections of tissue taken from the cervix while suggestive and helpful, are not absolutely conclusive, as the selection in the apparently normal tissue must be more or less at random. We also know that in the small group most influenced by radiation metastases can take place while the patient is under treatment.

The primary mortality in this early group is nothing like the 10 per cent. cited by others as one of the reasons for abandoning operation for radiation. In border-line cases, that is to say those in which the disease has evidently gone beyond the cervix on one side but in which the uterus though restricted in its motions still retains enough mobility to encourage the operator to take it out, we believe that the safety of the patient is enormously enhanced by treatment with radium alone. In this class the primary mortality from operation is high and the percentage of permanent cures is very low—they almost all recur.

In border-line cases I would use radium and rest in its use and not operate. We have tried operation and the results are discouraging; it is technically difficult and it risks spreading cancer cells which are quiescent and walled off.

As to the inoperable cases there can be no question at all—here radium is supreme and controls the field, the utterly unexpected and the miraculous often takes place and the patient recovers permanently. In cancer of the vagina where a cure by operation is a matter of extreme rarity, radium perhaps does its best work. The early and even some very advanced cases undergo rapid resolution. Let me recall for example a single instance, in an elderly woman the entire vagina was covered with a layer of fixed squamous celled carcinoma, the lumen was so choked the finger was pushed in with difficulty, no metastases could be felt. In four weeks the whole disease had disappeared and it has shown no tendency to return in three years. Over zeal in radiation resulted in a rectovaginal fistula which has not yet been closed.

Radium has come then as the greatest possible boon, first to act as an adjuvant to surgery in securing good results in the early operative cases, and second to do better work than the best surgery has even been able to do in the "border line cases," and third to give new hope and to cure a considerable number of the advanced *inoperable cases.*

Let me iterate and reiterate in this new field of therapy the demand is just what it has been in the old field of surgery, "gentlemen educate the public to apply early, and suspect every lesion you see as being a cancer until the contrary is proven."

THE PROBLEM OF HEAT AS A METHOD OF TREATMENT IN INOPERABLE UTERINE CARCINOMA

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(By Invitation)

There are three stages to be recognized in the development of the cautery in the treatment of carcinoma of the uterus: first, where it was merely used to stop hemorrhage and limit the offensive discharge.[1] Second: in the galvanocautery excision of the cervix uteri, developed by the late Dr. John Byrne, of Brooklyn, N. Y.[2] In this technic a high degree of heat was used, sufficient to cut the tissues. Third: in the dissemination of a coagulating degree of heat through the widest area possible of the cancer mass, with no attempt at immediate excision of the parts. (Percy.)

Concerning the first period in the use of the cautery in cancer we have no adequate record. It is more than probable that fire played an important part in the destruction of exuberant and other growths in the surgery of primitive man.[3] It is sufficient to know, however, that the cautery, in both remote and more recent times, has been used in a desultory way by surgeons, when the offensiveness of advanced surface cancer had become so great as to render the patient a horror to himself and to his associates.

It is also of tremendous interest to learn that for some unrecognized reason cancer would disappear occasionally

after the prolific mass had been melted down by the cautery in order to stop hemorrhage and the repulsive waste. More than this, when the cancer-invaded tissues were thus treated, they would heal over, and the patient would recover. In the last thirty years, this has become more than an isolated experience in the practice of many surgeons. But the appealing significance of these undeniable results in the detached or solitary case did not stir the imagination of the surgical world to a degree sufficient to promote the development of a definite technic for the use of the cautery such as would encourage further effort in the way of improved results. This remains true, even when we consider the really brilliant work of Byrne, whose galvanocautery removal of the cancerous cervix marks an epoch in the treatment of one important local form of cancer.

But the technic of Byrne was not designed for the advanced inoperable cancer patient, the one in which the uterocervical junction is fixed, with extensive malignant and inflammatory infiltration of both broad ligaments and the parametrium. As classified today, Byrne operated only in the first stages of cervical cancer involvement. It was in this type of case that he secured his really striking results. It was in this form of the disease that he deplored the use of the knife when made to do a vaginal hysterectomy, referring to it as "a comparatively fruitless procedure at best." This is just as true today, without the preliminary use of heat as it was in his day. It is a singular fact that the advice which Byrne gave to the medical profession, now forty-four years ago, not only as to the uselessness but the dangers of the cold-steel knife in cervical cancer, has been so slow of recognition. It is equally a cause of regret that gynecologists did not appreciate the value of the Byrne technic as a preliminary to the radical hysterectomy, as has been done in our day by Clark in his advocacy of the Percy technic as a preclusion to the Wertheim operation.[4] John Byrne, with

the mind of a seer, years ago recognized and put into scientific terms the fact of the autotransplantation of the cancer-cell, following the use of the knife unfortified with fire. He not only taught this, but he preached it; and I have yet to hear, from those who knew him best, that Byrne was deceived as to his results, or that it was possible for him to try to deceive others. The technic that he taught was not grasped in all its significance by his confrères, and, consequently, its great possibility for good was in large measure lost with his death.

This is especially true of any technic, when the possibility of improvement consequent to its use permits of constructive development, as experience shows its lack of perfectiveness. Byrne insisted upon the great value of the "deep dry roast" following the removal of the cervix with "less heat"[5] in the cautery knife. But all this was forgotten by surgeons until the writer, after considerable experience with the high degrees of heat, was forced to develop the low heat technic. The "dry roast" of Byrne, obtained with his comparatively miniature knife, was an attempt to get penetration; but it was not successful except in a fairly adequate degree in the class of cases for which it was advocated, that is, the early or first-stage case. The cases treated *before* the days of Byrne, by the cautery, were utterly inoperable from the standpoint of the knife; and the cautery was applied only with the idea of palliation. The cases treated by Byrne with his galvano-cautery excision of the cervix were the type of cases, a large proportion of which would be considered by surgeons qualified to do it, suitable for the Reis-Wertheim technic of today.

The author's technic brings us back to the days *before* Byrne,[6] to the treatment of the utterly hopeless case, the one that had behind it the exigency of inoperability and the tragedy of hemorrhage, to say nothing of the abhorrent stench, and the anemia, and the weakness, and the general hopelessness.[7] The cautery was used in this type of case only to make a pause, temporary though it was, on the road to

dissolution. But, as already stated, some of these cases recovered. Moreover, the author's technic opens up new possibilities in the type of case in which Byrne secured his best results, that is, the first-stage case. This technic has in it the reasonable hope of bringing the otherwise hopeless cancer-involved tissues back through the borderland of inoperability into the realm of the first-stage case.[4] The stage of operability with my present technic is easily 90 per cent., and I confidently expect that, if the promise which I see in my work is realized in the further development of the use of heat in cancer, the stage of operability will be without limit in strictly pelvic cancer. I would not have you believe, however, that the ideal is mere operability. Back of it all is the hope and promise of results never before obtained by any method so far developed in that disease which has always stood as a synonym for incurableness, pelvic cancer.

Before passing on to a consideration more directly of my own work, I want to express my pleasure at this opportunity of bringing my tribute of praise and appreciation for the work of Dr. Byrne. This is all the more significant when we remember that the subject of his address, while serving as the president of this organization in 1892, was the galvanocautery excision of the cancerous cervix. That address, for its insistence on two things, has made history; and their importance will grow increasingly significant as the value of what they have meant in the development of the treatment of cancer becomes clear. They were, as stated above, first: that the surgical knife in a vaginal hysterectomy encourages the dissemination of the disease; and, second, that the galvanocautery excision of the cancerous cervix "is destructive to latent cancer-cell proliferation in tissues far beyond the line of incision; hence, much more is comprised in the operation than the mere removal of a part, or parts, not more actively involved in the work of destruction."[2]

The Percy technic has back of it certain fixed and unquestioned principles. First, that the cancer cell is rendered sterile by a temperature of 45° C. (113° F.) if maintained for ten minutes. This is true not only in mouse carcinoma in the experimental laboratory, but I have also proven it to be true in human cancer by actual demonstration. Second, that a low degree of heat, carrying a pasteurizing temperature, will penetrate farther in a manner destructive to the cancer-cell than the high or carbonizing degrees of temperature. This comparatively low degree of heat will leave the normal connective tissue structures at the outermost confines of the disease uninjured, even if more or less involved in the malignant invasion. Third, the heat should be applied continuously until all fixed structures, both malignant and inflammatory, are freely movable. To do less than this merely means that the heat technic has not been employed in the most efficient way possible. In the cases complicated with a pyometra and pus tubes, it is one of the most gratifying experiences in surgery to witness the improvement of the patient following the sterilization of the uterus and adnexa after the thorough application of the heat.

My experimental work on the penetration of heat from the use of an electric heating iron at both a high and a low degree of temperature is significant and, I believe, valuable on this point.[8] High degrees of heat, 427° C. to 538° C. (800° F. to 1000° F.) carbonize the tissues. Carbon inhibits almost completely the further dissemination of heat. Low degrees of heat (Percy), 60 ° C. to 82° C. (140° F. to 180° F.) coagulate the tissues and permit of the greatest possible dissemination. Low degrees of heat, as a rule, destroy only the tissues that are already of no value because of the progress of the malignant process. It also leaves the minimal outermost confines of the disease to be devitalized by the heat with the least amount of injury to the normal tissue cells. High degrees of heat destroy the tissues before heat pene-

tration can occur to any extent, thus automatically limiting its use. Low degrees of heat (Percy) slowly applied, loosen up and liquefy the fixed tissues, immediate and remote, malignant and inflammatory. No such action as this can occur from the use of high degrees of heat.

It should be noted here, however, that there is such a thing as getting a degree of heat so low as to be impracticable when it comes to being a disseminating destructive force to the cancer cell at the outermost confines, where the existence of malignancy is still probable. As stated above, the cancer cell is rendered innocuous when its temperature is maintained for ten minutes at a temperature of 45° C. (113° F.) But in order to destroy cancer practically, it can be readily understood that the actual degree of heat in the heating iron must be above this mean of temperature. More than this, experience has shown that the required ten minutes necessary to destroy the reproductive power in the small piece of cancer tissue for laboratory experimentation must be greatly augmented when an attempt is made to destroy a large bulk of active human cancer. In actual practice, one can apply a degree of heat so low as to obtain neither penetration nor coagulation except in the area immediately in contact with the heating iron. In the emphasis which we are making in reference to the avoidance of high degrees of heat, it should equally be noted, I repeat, that the low heat can be applied in such a way as to be utterly futile as far as obtaining the very necessary penetration is concerned. It can readily be appreciated that, if an attempt is made to maintain the temperature in the heating iron in the center of a cancerous mass at 45° C., (113° F.) it would take an almost prohibitive length of time for this degree of heat to penetrate the wet tissues of the living subject if the mass were other than a very small one.

The knife which Byrne used for his galvanocautery operation for the removal of the cervix weighed 1 gm. (15 grains),

and was made of platinum. The Percy cautery knife is made of copper and weighs $37\frac{2}{3}$ grams (565 grains). Because of its light weight and construction, the knife of Byrne was difficult to maintain in operation below a temperature that would not cut the tissues nearly as easily as the cold-steel knife. In the wet tissues, this high degree of heat had very little penetrating power because of this moisture. Byrne overcame this, in a measure, by advocating that the surface left after the removal of the part by this electric knife should be gone over slowly with the hot knife in order to produce a "dry roast." But applying heat in this manner on the surface means practically that the greater part of the heat is dissipated into space; and I have determined by experimentation that the penetration obtained under these conditions cannot be over one-fourth inch. Therefore, only a limited degree of heat penetration into the tissues can be obtained by the process of "roasting" or "desiccating" them. All degrees of heat which cause roasting or desiccation of tissues finally mean but one thing, namely, carbonization; and, as I have had occasion to repeat so often, carbonization inhibits heat penetration. The circulating blood equalizes the temperature in the tissues through which it moves, until the heat from the heating iron becomes sufficient to coagulate it. Carbonization, again, will not inhibit, except through a very limited area, the circulation of the blood in the malignant tissues. The circulating blood prevents the penetration of heat or of cold. This is also true when the "dry roast" or desiccation is aimed at. The "dry roast," "desiccation" and "carbonization" are really synonymous terms when the question of heat penetration is under discussion. Heat penetration cannot be obtained, or maintained, until the temperature is gradually raised to a degree sufficient to arrest the circulating blood. As long as the blood circulates in the cancerous tissues, uninfluenced by the heat, the tissue cells are protected from destruction

in much the same way as the tissues that are outside of the water-cooled speculum are protected. Coagulation of the tissues, on the other hand, with a low heat, permits of the widest possible dissemination of the heat.

The degree of temperature which actually exists in the heating tip and shank, in order to produce the coagulating effect on the involved area, I have not yet determined. I believe, however, that this problem can be easily and accurately solved with the recently devised Potentiometer of Dr. Holding, of New York.[9] This instrument was invented for the express purpose of determining not only the degree of heat in the heating iron used in my technic, but also that of the tissues when under treatment. It will do away with much of the uncertainty and inexactness that has heretofore characterized the practical use of the heat in uterine cancer in many clinics, including my own. With this instrument, a coagulating temperature can always be determined and maintained, and the mistake of carbonization avoided. In the near future, I hope to be able to give accurate data not only on the degree of temperature required to produce coagulation, but also the distance that penetration of heat may be obtained and maintained in living structures. Again, this instrument, I am quite sure, will settle the question of the effects of heat penetration in tissues along the lines of physical laws already known, and confirm anew my experimental work already referred[4] to in the efficacy of low over high degrees of heat in the destruction of cancer.

In conclusion permit me to re-emphasize, first: that the Percy technic, so-called, is *not* a cautery operation. I remove nothing. The tissues, following the application of the moderately low degrees of heat, are literally coagulated and slowly dissolve. It usually takes two weeks for a healthy granulating surface to appear beneath the gradually dissolving mass of inert cancer debris. Second: the operation of Byrne was a high galvanocautery excision of the cervix.

There could be but little penetration of heat. Byrne recognized this when he advised that the surface left after the removal of the gross mass be seared over with the cautery knife, in order to get all the heat penetration possible. But Byrne never thought of applying heat to the degree of obtaining penetration sufficient to render movable the fixed tissues in the pelvic basin. If the fixed tissues, malignant and inflammatory, are not made freely movable, as they are normally, the heat penetration has not been sufficient, and, therefore, is ineffective. Third: to coagulate a large mass of uterine cancer requires from thirty to sixty minutes, and if the broad ligaments still remain stiff, or fixed, the heating iron must be directed into each in turn, for at least an additional ten minutes. Fourth: in my effort to emphasize the importance of avoiding the burning temperature, I fear that I have led many surgeons to the opposite extreme, and that they are trying to destroy the activity of an inoperable mass of cancer with a temperature so low that days, rather than hours, would be required to make the heat effective. Byrne fried his tissues, I broil, or pasteurize them. The Byrne technic was based on the use of heat as an acute process. Mine is not acute, but chronic, both as to time and degree. Heat, more heat, and yet more heat; but heat, not fire; broiling, not frying; not roasting, but curdling; pasteurization, not desiccation; coagulation, not carbonization.

In its practical application, the whole technic can be summed up in the one statement: do not carbonize the tissues, for in the degree that this is done, in that degree is heat penetration inhibited; and heat penetration is the vitally essential thing. A gentle simmering sound only should be heard when the ear is placed near the vaginal water-cooled speculum. This simmering sound is produced by a temperature above 45° C. (113° F.). It probably ranges from 83° C. to 93° C. (180° F. to 200° F.). Heat in cancer,

operable or inoperable, or as a preliminary to the use of the cold-steel knife, has, with its present development, come to stay. It offers more in the way of cure, in the early case, than any other treatment so far devised. In the late case it promises surcease from suffering, with a prolongation of life that is most hopeful.

But more than all else, we have not yet fully learned the technic of most effectively destroying cancer in the accessible regions of the body by heat. When we do, another chapter will have been written in the history of man's contest with his physical ills that will compare very favorably with anything so far accomplished along the lines of scientific endeavor.

Bibliography

1. The use of fire in surgery has a most ancient lineage.

2. Dr. John Byrne. President's Address, American Gynecological Society, 1892; American Journal of Obstetrics and Diseases of Women, October, 1892, xxvi, 575.

3. See "Following the Equator," by Mark Twain, p. 220; American Publishing Co., Hartford, Conn.

4. Preliminary Report on the Use of the Percy Cautery in Carcinoma Uteri, with Especial Reference to Its Use as a Forerunner to the Wertheim Operation: Dr. Samuel M. D. Clark, New Orleans, La.; Surgery, Gynecology and Obstetrics, May, 1915, xx, No. 5, 558.

5. Cancer of Cervix: Discussion by Robert L. Dickinson, M.D.: Surgery, Gynecology and Obstetrics, March, 1913, xvi, 281.

6. Byrne first described and advocated his galvanocautery technic about 1872.

7. The results of this new and intensely interesting and hopeful work I will give to the profession in a later publication.

8. Best methods of Discouraging the Activity of Inoperable Cancer: A Study of Heat in Cancer: The Journal of the American Medical Association, May 23, 1914, lxii, 1631–1634.

9. This apparatus is made for Dr. Holding by Messrs. Leeds & Northrop, 4901 Stenton Ave., Philadelphia, Pa.

HIGH DEGREES OF HEAT VERSUS LOW DEGREES OF HEAT IN THE TREATMENT OF CANCER OF THE UTERUS

By H. J. Boldt, M.D., F.A.C.S.
New York

Your secretary has requested me to add a ten-minute contribution to the symposium now before your society; my part to be on high degrees of heat compared with low degrees of heat, as a palliative treatment for advanced cancer of the uterus. Inasmuch as I but recently reported the result of my observations, I can add little to that which I published in the *American Journal of Obstetrics and Diseases of Women*, January 1916, except to say that, judging from the many letters received from colleagues who have had experience, my position is amply justified, and to add that Dr. F. W. Bancroft, of New York, has verified my position by an autopsy on a patient who had been subjected to low heat, in accordance with the technic advocated by Dr. Percy.

I do not wish to be understood as detracting from the usefulness of low heat application. On the contrary, I commend it; but not as the method to be used under all conditons. It should be reserved principally for a second application, after the rapid destruction has been accomplished by high heat, and the charred eschar so caused has been thrown off; and for cases wherein the malignant process has so far advanced that the thorough application of high heat would endanger the bladder or rectum, despite great

care to avoid injury. It may happen, as a secondary result, that a slough may be caused, and thus a vesical or a fecal fistula be established. Although such fistulæ frequently close spontaneously, we know from experience, that if they do not close, how difficult it is to bring about a closure by operation.

Then, too, the danger from secondary hemorrhage is not less with low heat than with high heat. Indeed, it is held by some to be greater when low heat is used; though to judge from my own experience, that position is untenable.

These, however, would be negligible features, if with low heat alone we could accomplish a better final result. So far there has been no evidence presented by any one who has had experience with both methods properly tried on a series of patients that showed the superiority of one over the other. It may be admitted that, now and then, heat has cured a patient although personally I have not seen such an instance.

Indeed, were I to rely solely on the report of results, I should relegate heat to the "has been" remedies and only advise radium. But we do know that with heat properly used, and applied in properly selected cases, we have a therapeutic agent that sometimes gives remarkably good palliative effects. Dr. Percy, who is the strong advocate of low heat, makes claims for it that I have been unable to substantiate. He asserts that it has a deeper penetrating ability on the tissues, and that it destroys carcinoma elements farther away from the surface to which it is applied, than high degrees of heat, and hence its potency to cure some carcinoma patients of their disease. The late Dr. Byrne, to whom the medical profession is indebted for bringing the treatment of cancer of the uterus with heat into vogue, many years ago, made similar claims for high degrees of heat; but he was unable to convince me that it was more than an excellent palliative agent. So far as I know, no proof of further efficacy

has been demonstrated by Percy. On the other hand the clinching facts, as shown in Dr. Bancroft's case and in my case, in which autopsies were procured and a microscopic examination of the tissues made, are that the cancer cells were not destroyed to any appreciable distance from the surface of application of the low heat, certainly not farther than would have been the case with the high heat application.

Dr. Charles Mayo, in discussing my paper on this subject at the last meeting of the Southern Surgical and Gynecological Society, cited in proof of the curative power of low heat, used as Percy directs, a number of instances in the Mayo clinic at Rochester of what seemed inoperable cases of uterine cancer, that subsequently became operable, adding that when the uteri in these cases were examined by the pathologist, he failed to find any evidence of malignant disease in them. I cannot, however, accept this statement as verification of the hypothesis that low heat destroys cancer elements some distance from the surface of heat application. It can be accepted only as a personal belief, based upon clinical manifestation of the individual patient. In such a case my view would be that the patient had, in connection with the cancerous cervix, a pure inflammatory condition, either parametritis, or a local pelveoperitonitis, which caused more or less immobility of the uterus, and that as the result of the heat treatment, the near-by structures became dried out and mobility of the uterus ensued; but the cancer itself had not penetrated beyond the depth of the cauterization. Such clinical manifestation we also see with high heat. The inflammatory infiltration may subside, but the carcinomatous infiltration remains. To disprove my contention it is necessary that the operator should, when the abdomen has been opened, remove a part of the suspicious infiltrated area in the pelvis a reasonable distance away from the cervix and have it

examined by a competent pathologist. If that shows cancer nests, and the uterus becomes mobile subsequently so that a radical operation may be done, and the specimen then removed by a real *radical* operation fails to show cancer elements, we are in a position to grant the alleged deep destruction of cancer elements, but not until such proof has been shown.

I call attention to those instances in which recovery followed a simple extirpation of the uterus despite the presence of some parametrial infiltration, and in which, after a period of a few months a re-examination failed to show evidence of infiltration. I myself recall two such instances.

But let us pass from the theoretical and clinical test to the crucial scientific test—the test being a deduction as the result of an examination of tissue treated by low heat in the *living* body—by which we may get evidence which is beyond the possibility of deception. This test showed, beyond a scintilla of doubt, that the cancer nests were destroyed only in the cauterized area and in the area immediately in contact with the cauterized surface. Even within only one millimeter of the charred zone, apparently unaffected cancer nests were found. Surely high heat cannot exert a less destructive action on cancer cells.

It is far from my intent to detract anything from the credit of our colleague, Dr. Percy, but I believe that his enthusiasm has misled him, as the result of his clinical experience, to become imbued with unfounded hope.

Byrne, although not the first man to use heat as a palliative measure, was the one to bring this treatment to a fairly extensive acceptance and was equally enthusiastic, as for a time were his followers. And when I say his followers (and I am one of them), I mean those who cauterized as thoroughly as was directed by Byrne, not superficially, as I have seen done time and again, and yet called "cauterization by the Byrne method."

To speak for myself, I can say conscientiously that I obtained and am obtaining with high heat, results equally as good as those obtained by Dr. Percy, with low heat, particularly since I open the abdomen, as insisted upon by Percy. It is my belief that if Dr. Percy will use either high or low heat, according to indications, he will arrive at similar conclusions, especially if he subjects his work to a critical scientific analysis whenever opportunity presents itself. I believe that the advice of our late colleague, Dr. Pryor, to tie the internal iliacs in cases of cancer of the cervix, is also of importance as a palliative measure.

REPORT ON THE AMERICAN SOCIETY FOR THE CONTROL OF CANCER, ORGANIZED IN WASHINGTON, 1913

By LeRoy Broun, M.D.
New York

At the ninth meeting of the Congress of American Physicians and Surgeons held in Washington in May, 1913, the American Gynecological Society presented to the other branches of the Congress a resolution requesting the appointment of delegates to coöperate in forming a national organization to conduct educational propaganda for the prevention and cure of cancer. The Gynecological Society had just adopted the report of its committee appointed a year previous, and had recommended that a society should be established for the purpose of conducting such a campaign of education and for collecting data of scientific value. In preparing its report the committee of the Gynecological Society had secured the interest and promised support of a group of lay citizens of New York, five of whom, Messrs. John E. Parsons, V. Everit Macy, James Speyer, Thomas W. Lamont, and George C. Clark, had guaranteed $5000 toward the first year's expenses of the proposed organization, but solely on condition that the project be approved not only by the Gynecological Society but the profession generally.

A majority of the constituent societies of the Congress promptly responded to the request of the Gynecological Society and the following delegates were appointed:

1. American Dermatological Association: Dr. S. Pollitzer, Dr. M. F. Engman.

2. American Surgical Association: Dr. George Brewer, Dr. Joseph Bloodgood, Dr. Charles L. Gibson.

3. American Laryngological Association: Dr. George B. Wood, Dr. J. Gordon Wilson.

4. American Otological Society: Dr. Charles W. Richardson, Dr. George B. Shambaugh, Dr. Christian R. Holmes.

5. American Association Genito-Urinary Surgeons: Dr. H. A. Fowler, Dr. F. R. Hagner.

6. American Gynecological Society: Dr. Reuben Peterson, Dr. Edward Reynolds, Dr. Thomas S. Cullen, Dr. Frank F. Simpson, Dr. William E. Studdiford, Dr. Frederick J. Taussig, Dr. Howard C. Taylor, Dr. LeRoy Broun.

7. American Association of Pathologists and Bacteriologists: Dr. A. S. Warthin, Dr. James Ewing.

8. American Orthopedic Association: Dr. Reginald H. Thayer, Dr. J. E. Griffith.

9. American Opthalmological Society: Dr. Richard A. Reeve, Dr. F. E. Cheney, Dr. Hiram Woods.

10. American Neurological Association: Dr. Harvey Cushing, Dr. B. Sachs.

These delegates were invited to a meeting at the Harvard Club in New York City on May 22, 1913, at which time the American Society for the Control of Cancer was duly organized and the following declaration of its design and scope embodied in the constitution:

"To disseminate knowledge concerning the symptoms, diagnosis, treatment, and prevention of cancer, to investigate the conditions under which cancer is found and to compile statistics in regard thereto."

It is but fitting that a movement which traces its origin and so large a part of its prestige with the profession and public to the Congress of 1913 should present on this occasion an acknowledgement of indebtedness to all the coöperating organizations and make some account of methods of work and progress during the last three years.

Plan and Scope. The purpose of the society as just stated prescribes two main lines of activity: (1) a campaign of public and professional instruction, and (2) the collection of statistical data. Experimental research, the support of hospitals or clinics, and the care and treatment of individual patients are not contemplated. In extending its influence and carrying on its work the society necessarily devotes a large share of its direct efforts to securing the interest of other organizations and forces which are in a position to render assistance in local fields.

Professional Endorsement. In the months immediately following the formation of the society under the auspices of this Congress, other prominent professional bodies successively recorded their approval and support of the project. Resolutions of endorsement have been adopted by the American Medical Association, the Clinical Congress of Surgeons, the Western Surgical Association, the Southern Surgical and Gynecological Association, and many State and local medical societies.

Executive Control. The government of the society is vested in a Board of Directors which numbers sixty-six members, including practitioners of recognized standing and prominent and interested laymen and women from many parts of the country. The direction of the work in detail is delegated to an executive committee of thirteen directors, including the chairmen of standing committees on organization, membership, finance, publication, and statistics. The professional members of the board act in conjunction with the executive committee as an advisory council which formulates the general policies of the society.

Membership and Finance. Insofar as paid service is necessary to supplement the volunteer work which is the chief source of the society's vitality, a modest budget is raised entirely from dues of members at five dollars per annum and from special contributions in larger amounts. The so-

ciety has no endowment and no fixed income from any philanthropic foundation. At present there are 577 members and contributors of all classes, approximately half of whom are physicians, the list including some of the leading American practitioners. The interest and support of these doctors is a chief asset of the society, and this opportunity is taken to urge every member of the Congress of Physicians and Surgeons to contribute his influence by becoming an annual member.

State and Local Committees. Branch committees of the society are formed in the several states and cities, not as independent local organizations, but as integral parts of the single National Society. The chairmen of State committees are usually members of the National Board of Directors and are vested with full power to appoint the other members of their committees and supervise their work. State committees in turn may organize local committees in the principal centers of population wherever the interest and needs warrant. At the present time, State committees have been authorized in sixteen states and several others are in the process of formation.

Organization and Coöperation. The society has considered it a matter of first importance to develop its national executive office as a central bureau and clearing house through which to seek the coöperation of all appropriate general and local agencies, and to receive and transmit impulses tending to further the propaganda of public instruction in all parts of the country. Standing in close relation on the one hand to the leading experimental and statistical students of the disease who represent sources of new and old knowledge of the subject, the society is on the other hand in helpful contact with the various social forces which can be called upon to transmit the essential facts to the public.

Boards of Health. Wide-spread and increasingly effective work is being done by state and city boards of health in the direction of instructing the public regarding the preven-

tion of disease. The society therefore endeavors to have the more progressive health officers devote a proportionate share of attention to cancer in this connection, and the national office undertakes to furnish data, statistics, and special articles produced under the supervision of the appropriate committees, for local use in the name of the board of health. Many health boards, including particularly those of Michigan, Virginia, North Carolina, New York, Massachusetts, Kansas, New York City, and Toronto, are now taking an active part in this campaign while a number of other departments have made a beginning.

Medical Societies and Education of the Profession. The design of the society is taken to include efforts to keep the general practitioner in touch with the latest developments in the knowledge of cancer and cognizant of his duty to the patient. In this field, however, it is felt that the regular professional organizations should take the lead. The society therefore offers all possible coöperation and assistance to state and county medical societies in providing literature and speakers, and to the various medical journals in publishing appropriate articles. Many state societies have appointed special cancer committees, some of these as in the case of Pennsylvania antedating the formation of the national organization and representing notable pioneer work in this field in America. In several instances the committee of the national society and that of the state medical society have been made identical. The existing state committees on health and public instruction have also been approached with reference to the inclusion of cancer in their programs.

Nurses. Systematic effort is made to promote the instruction of nurses regarding the earlier phases of malignant disease and predisposing conditions, in order that they may be adequately prepared to advise people, especially women with whom they come in contact in the course of their duties, to seek professional attention in time. A series of special articles for nurses has been published, meetings for nurses

have been arranged, all the leading schools of nursing in the country have been urged to include in their courses lectures on the early signs and symptoms of cancer, and opportunities are sought to present the subject at the annual meetings of state and national organizations of nurses, a number of which have recorded their endorsement of the purpose and methods of the society.

Social Workers. The field workers of charity organization societies have similar opportunities to advise people who do not ordinarily read newspapers and educational books and pamphlets. The national office has therefore circularized several hundred of the larger charity organization societies in the various states, seeking their interest and coöperation in holding public meetings and in arranging for the special instruction of the members of their working forces.

Women's Clubs. Women's organizations have proved one of the most effective single agencies in disseminating knowledge of early cancer and the conditions leading to the disease. The work of the society has been brought to the attention of the national and State federations of women's clubs, and the appropriate committee officials have been circularized in order to secure their coöperation in suggesting this topic to local clubs. As a result women's clubs in many states and cities have frequently taken the lead in arranging public meetings and in providing lectures in their regular study programs.

Insurance Companies. The coöperation of the leading insurance companies is sought not only in respect to statistical investigations but for the distribution of educational literature. One of the largest companies has reprinted at the suggestion of the society a cancer leaflet which it is prepared to distribute to the number of two million copies. At the recent meeting of the American Life Convention a resolution was adopted providing for the distribution by insurance companies generally of a brief uniform circular approved by the society to be sent out in premium notice envelopes, thereby

reaching many thousands of intelligent people. The Life Extension Institute, which grew out of the educational work of insurance companies has advised its subscribers regarding the early recognition of cancer and is indirectly furthering the campaign by its propaganda for periodical physical examinations.

Industrial and Welfare Organizations. Many of the larger industrial, commercial, and transportation companies have undertaken extensive welfare work and health instruction for the benefit of their employees. The society has offered to the appropriate officials of these companies any desired assistance in providing speakers and circulars, or suggestions for the preparation of special literature to be distributed by the companies themselves. In this connection the coöperation of such organizations as the National Civic Federation, the National Safety Council, and the American Museum of Safety has been invited.

Newspaper Publicity. By direct effort and through its local committees and various other agencies already referred to, the society stimulates the publication of carefully considered newspaper articles. So far as possible the character of this matter is controlled by the national organization, which sends out in its own press service short articles prepared under the close scrutiny of a committee on publication made up of professional men of recognized standing. From the beginning the society has also had the benefit of the constant advice and coöperation of the Council on Health and Public Instruction of the American Medical Association, and by special arrangement a cancer article has been supplied for each issue of American Medical Association press service which reaches a selected list of several thousand newspapers. Valuable newspaper publicity has also been secured through the work of some of the leading State and city boards of health, whose statements to the editors on this topic are frequently given better attention and more space than articles sent out by a distant national bureau.

Circulars and Bulletins. The society has published for general distribution to the public a number of leaflets giving in simple language the elementary facts about the disease. These circulars are distributed directly on request to the central office or indirectly through local committees. Arrangement has been made to provide these or other approved circulars at small cost to boards of health and other local organizations in a position to purchase and distribute such material.

A series of special bulletins is also published for more limited distribution among members of the society and those who are directly concerned in organizing local educational campaigns.

Public Meetings and Lectures. To inaugurate work in each of the more important cities, the coöperation of professional, civic, and religious forces is secured in arranging a general public meeting at which recognized experts may discuss the various phases of the cancer problem. Perhaps even more effective in reaching the public with the facts are lectures given under various auspices, particularly women's clubs, to small audiences under conditions such that a single speaker can present the subject in a more direct and convincing manner. It is a particular function of local committees to arrange for such lectures. The society through its national and branch offices undertakes to act as a lecture bureau and to provide qualified speakers for meetings in any part of the country.

Statistical Research. The second principal object of the society is to organize statistical research on a broader basis than has hitherto been possible. While numerous individuals, clinics, research laboratories, insurance companies, and public health departments have been interested in this field and have done valuable independent work, the society has now undertaken to coördinate all these agencies for the conduct of special investigations on a larger scale. To this

end a statistical advisory board has been formed which includes thirty representatives of the leading American organizations in the several classes referred to.

National Mortality Statistics. At the suggestion of the society the director of the United States Census has ordered the publication of a special report on the cancer mortality of 1914 which is now in press and will constitute one of the most important statistical studies of this disease so far made under the auspices of any government. An important advance undertaken in this connection at the suggestion of a prominent American surgeon is the distinction made between the figures of deaths in which the diagnosis was reached after autopsy, surgical intervention, or microscopic examination, and those in which the diagnosis was based merely on clinical observations. In addition, the forthcoming report will give the figures in far greater detail than hitherto and according to 29 separate organs and parts of the body affected instead of under the seven group titles of the international list of causes of death as used in the annual reports of the Census Bureau. Much of the improvement with respect to greater detail and accuracy which characterizes this special report will doubtless become a permanent feature of the American national statistics of cancer.

Operative Statistics. The society has also undertaken the collection and study of records of operations for cancer in numbers approximately as great as those represented in the national mortality statistics. A blank has been prepared by a sub-committee of the Statistical Advisory Board and leading surgeons throughout the country are asked to cooperate in this study by reporting thereon a few essential facts regarding each case of the disease on which they operate, either in private practice or in hospital service. The records thus obtained will be followed up at intervals of one year by inquiry addressed to the surgeon and the data will be tabulated and analyzed by expert statistical methods. Any new

and definite evidence as to the curability of cancer which may result will be laid before the public in the course of the educational campaign, but any such announcement will be in the name of the society and no comparison or publication of the work of individual surgeons will be authorized.

Hospital Records. The committee on statistics has also prepared a series of more detailed blanks, one for each principal type of malignant disease, on which to record the full history of cases as a basis for careful study of etiological factors. These forms have been put into experimental use and when perfected will be offered for use in a number of the larger hospitals in the endeavor to bring out important factors surrounding the occurrence of cancer in the individual, in the family, and in the community.

DISCUSSIONS ON THE PAPERS OF DRS. FRANK, STONE, GAYLORD, CLARK, PETERSON, KELLY, PERCY AND BOLDT

Dr. V. N. Leonard.—I wish to call attention first to some experimental work which has been done on cutaneous burns. The pathology of fatal cutaneous burns is quite characteristic. First, acute gastric and duodenal ulcers; second, hemorrhagic effusions into the serous cavities, particularly the pleura and pericardium; third, degenerative processes in the central nervous system; fourth, epithelial necroses in the parenchymatous organs, particularly the kidneys. In addition to this, the Malpighian corpuscles of the spleen and likewise the lymphatic system in general shows marked degenerative changes.

The toxins produced by a superficial burn have been undeniably shown to arise in epithelial tissue. These toxins are probably not Pyridin derivatives as some investigators have contended, but are complicated organic compounds; cleavage products of epithelial proteids, which are probably comparable

to the labile poisons of snake venom. The pathology caused by their absorption is usually characteristic. I have mentioned the main characteristics of the acute systemic pathology produced.

It has long been a matter of some mystery that certain cases of superficial cutaneous burns, limited in extent, would prove fatal, while other cases of extensive burns through the skin, down to the fascia and even through the fascia, have been attended with practically no constitutional symptoms. The reason, based on experimental work, is that the cleavage products of normal epithelium produced by incomplete combustion are intensely toxic, which is not true of muscle tissue for instance. If the burn is insufficient to destroy the epithelium, these very toxic substances are absorbed with the consequent production of the more or less typical pathology. If the burn is so extensive as to entirely destroy the epithelium, no such toxicity is seen. Clinically this fact is abundantly borne out.

Last year, a young girl, about ten years of age, was admitted to the surgical clinic of the Johns Hopkins Hospital with a superficial burn of the abdomen which could be covered by an ordinary teacup. That burn proved fatal. Shortly after that a man was admitted to the clinic with a deep burn from his neck down to his knees, a mass of tissue being burnt away by high heat, including all the epithelial elements of that area, and the tissues down to the fascia and in places through the fascia. This patient recovered. He showed no constitutional symptoms probably because the epithelium was entirely destroyed, and the intensely toxic cleavage products of epithelium were not produced.

In the gynecological clinic of the Johns Hopkins Hospital we have only recently taken up the treatment of inoperable carcinoma by low degrees of heat according to the Percy method. There are only five cases I have operated on myself. Dr. Kelly has had some others.

The case I wish to report is that of a woman, fifty-two years of age, the menopause at 42, who had shown symptoms for five months. When she presented herself at the clinic she had an inoperable carcinoma of the cervix, the carcinoma having extended far up into the uterus and out into each broad ligament, forming a large broad ligament mass on each side, adherent to the pelvic wall. The uterus was fixed in the pelvis.

We opened the abdomen, ligated both internal iliac arteries and both infundibulo-pelvic ligaments with silk. The knees were then elevated over the abdomen, with careful protection of the incision, and the assistant having a firm hold on the uterus as advised by Dr. Percy. Point "A" was then introduced into the uterine cavity and coagulation continued for one hour. At no time was the heat raised to a point sufficient to char the tissues; yet, at all times, was the heat maintained at a temperature which was just insufficient to cause the assistant, wearing a medium weight rubber glove, as Dr. Percy advises, marked discomfort. At the end of this period the uterus became slightly more movable, but the large mass in each broad ligament was still firmly fixed. The patient had a hydro-ureter on the right side. We introduced point "E" into the center of each broad ligament mass and coagulated for a period of half an hour for each broad ligament. The actual temperature of the coagulating point was not measured with a thermometer, but the heated area was raised to such a degree of heat that one could not keep one's finger in the vaginal vault for more than a second or two. This patient received in all, two hours of actual coagulation at a temperature which was raised to a point insufficient to char the tissues, but sufficient to make the assistant somewhat uncomfortable.

Following the operation the patient was in rather poor condition; her pulse was quite rapid, but otherwise there was nothing alarming. On the morning of the second day she developed an acute gastric dilatation, and began to vomit large quantities of the typical brown watery material. On the third day she developed an urinary fistula. We expected this because she had a hydro-ureter on the right side. On the morning of the fourth day there was some improvement. About noon of the fourth day the acute gastric dilatation returned, was immediately relieved by gastric lavage, but immediately returned again. Toward evening the distension became general. During this time enemata had not been successful in bringing away any fecal particles, but merely a small amount of gas. For this reason I thought the patient had developed a paralytic ileus and ordered the operating room ready to make an enterostomy. While preparations were being made the patient suddenly died. I was not present at the time of her death, but from the description I thought very likely she died from a pulmonery embolus.

The autopsy findings were extremely interesting. There were: hemorrhagic effusions into the pleural and pericardial cavities; there were twenty-four acute gastric ulcers; acute epithelial necrosis in the kidneys; and an extreme grade of cloudy swelling of the liver. This patient did not show the typical degenerative processes described in the lymphatic system and Malpighian corpuscles of the spleen. The brain has not yet been examined.

Locally, three areas were seen. For a short distance around the coagulating point there was an area of general necroses. Just outside of this area were found masses of what appeared to be dead carcinoma cells. Surrounding these masses of carcinoma were apparently normal smooth muscular tissue and connective tissue fibers. At the periphery one centimeter from the surface of the coagulating point there was active carcinoma.

I do not believe that the technic could have been carried out more thoroughly without killing this particular patient on the table, and as she was in good physical condition at the start I do not see how the technic could be carried out more thoroughly in any case. The anesthetic was continued for a period of three hours and ten minutes.

The uterus received a full hour of coagulation. Sections taken through the posterior wall of the uterus showed active, viable carcinoma at a distance of one centimeter from the coagulating point.

This case was presented at the Clinical and Pathological Conference of the Johns Hopkins Hospital and last Monday Dr. William H. Welch, presiding, gave us some very interesting suggestions. His first remark was, "Here we have the pathology of a fatal cutaneous burn." In looking up the literature regarding cutaneous burns, one finds a great analogy not only in the pathology of this case but in the clinical course of these cases following the Percy cauterization. When we consider it, the conditions are very much the same. Here we have a mass of abnormal epithelial tissue. We subject that mass to a degree of heat insufficient to destroy it, but probably sufficient to cleave the epithelial proteids into very toxic split products. These, if absorbed, I feel confident will produce very much the same symptoms as the absorption of the split products of normal epithelium as seen in extensive cutaneous burns. This

suggests, in the first place, an addition to our ordinary preparation of a patient for operation. Water should be forced, the excretory functions should be stimulated as much as possible not only before operation but immediately afterward and continued as long as the patient shows the slightest sign of developing any toxic symptoms.

It is difficult to irrigate an area of this kind. In an extensive cutaneous burn showing marked systemic symptoms we can put the patient in a continuous tub and a large amount of the toxic products formed at the burned area will be diffused into the bath instead of being absorbed and the constitutional symptoms will in a great many cases disappear. Possibly by some improvement in our technical methods continuous irrigation of the heated area might be established.

Just one more point relative to the experimental work mentioned in Wells' *Chemical Pathology*. The red blood corpuscles are injured when the part through which the blood is circulating is heated to 45° C. (113° F.), which is the temperature at which the carcinoma cells succumb. When this temperature is raised to 52° C. the red blood corpuscles fragment. At 113° F. the respiratory function of the hemoglobin is seriously impaired. It seems to me, that this is a very important argument for the ligation of arterial supply to the heated area before any prolonged application of heat is undertaken. If we heat an area such as that in question for a solid hour it is likely that most, if not all of the blood in the patient's body will have passed through that area within that time. If we heat to only about 45° C. respiratory function of the red blood corpuscles will be seriously impaired. At least, one of our patients showed air hunger and I would like to hear Dr. Percy say whether he noticed it or not. This clinical observation was borne out also by measuring the carbon dioxid tension of the alveolar air. We found the carbon dioxid tension to be lowered considerably, that is, there was increased aeration of the lungs.

Dr. George Gellhorn.—I can confirm most of the technical statements made by Dr. Percy, but I regret that he had failed to give due recognition to the man who has preceded him in his work. Mackenrodt twenty years ago did most of the things that Dr. Percy has advocated today. He applied a heavy galvano-cautery, heavier even than the one Dr. Percy has shown us. He has used both high degrees of heat and low

degrees of heat and even the water cooled speculum was anticipated. All this can be read in a monograph published in 1898 in which I reported the results obtained by Mackenrodt.

At that time we first removed the entire cancerous uterus by means of the white hot cautery, and the bleeding from the cut surfaces was stopped by coagulation with low heat. There were no ligatures used in those days. We checked the bleeding even from the uterine and ovarian arteries by coagulation in the fashion advocated by Dr. Percy (now and then the major vessels would have to be ligated in spite of the preceding coagulation). We felt at that time that the heat had a destructive effect upon cancerous particles remaining in the immediate neighborhood of the excised growth and attributed to this the fact that we observed practically no local recurrences. Yet, Mackenrodt abandoned his method of igni-extirpation because he realized that the salient point of any operation for cancer must needs be the removal of the regional lymphatics. It is obvious that no local treatment such as the Percy method, can be of avail as soon as the cancer has progressed beyond the borders of the uterus into the lymphatic system and this class, unfortunately, represents by far the largest number of cancers that come into our hands. Whatever has been said about the possibility of Radium or operation, the percentages of cure are lamentably low.

For this reason the question of prevention of cancer rather than cure, must still be in the foreground of our interest, and therefore the topic introduced by Dr. Stone this evening is a very timely one and should not be passed without discussion.

I am thinking at this moment not so much of cervical lacerations as of a certain class of climacteric and post-climacteric hemorrhages in which the microscope reveals no malignancy. Such cases make me feel quite uneasy even though on histologic examination only benign conditions are found in the scrapings. If the endometrium shows a marked degree of activity in an increase of both the stroma and the parenchyma albeit benign, I believe that such a uterus had better be removed, other things being equal. Such a uterus is potentially malignant, and one preventive hysterectomy is infinitely superior to fifty curative ones. No one can accuse me of excessive surgical tendencies, but there are conditions where radicalism is better than half-hearted conservatism.

Dr. Charles P. Noble.—The question of the origin and the cause of cancer is one that is interesting to us all, and I wish to make some remarks on the teratological bearings of the problem.

I have had the privilege of several conversations with Dr. Stockard who is one of the most active teratological experimenters that we have. Those of you who are familiar with his work know that he has perhaps carried experimental teratology farther than any other investigator.

The theory of Cohnheim of the cause of cancer is that it is due to the presence of arrested cells or cell nests, which became stimulated into activity by various causes, in adult life.

The types of cancer that are dealt with experimentally have been in certain breeds of mice and rats which are used in the laboratory. These breeds or stocks have all been bred from particular stocks, and have all lived for many generations under conditions of environment that are not natural to these animals. In the first place, the Albino mice and Albino rats are degenerate. In the second place they have been bred in an abnormal environment. These are the points I wish to emphasize.

In discussing this matter with Dr. Stockard he pointed out that the experience which they have had in the teratoligical laboratory as to the behavior of cells under the influence of the poisons which they used made it appear to him not only probable but almost certain that the explanation of the behavior of cancer cells depended upon the degree of arrest of the cells and the character and the dosage, that is the potency, of whatever agency stimulates these cells into activity.

Those who know the clinical side of cancer are familiar with many of the facts which bear on the question of cancers which come from occupations and from habits. In China, for instance, where men shave their heads, they use dull razors; whereas cancer of the scalp is almost unknown anywhere else, it is common in China. In certain other countries they use ropes to carry their burdens, and where those ropes have come around the body we have cancerous development. I could increase the list very largely, but to cut it short, wherever there is long continued irritation cancer is apt to develop. Clinically, we recognize this in the relation of cancer of the gall-bladder to the persistence of stones. The point I wish to emphasize is Dr.

Stockard's remarks upon the question as to whether cancer develops under the influence of toxic poisons, or physical causes of irritation, or whether benign tumors develop. Where we have chemical irritations, whether purely chemical or whether toxins from germs, when the cells are somatized we have inflammation. On the other hand, if the cells are not somatized, if they are arrested, we get the ordinary benign tumor, and if much arrested we get a malignant tumor.

Dr. George Gray Ward, Jr.—I have been very much interested in the problem of inoperable cancers treated by Dr. Percy's method ever since I had the opportunity of seeing him demonstrate his technic on several occasions in New York. I have utilized the method at each opportunity that presented itself to me since October, 1914. In listening to Dr. Percy talk at different meetings and in reading his publications, I have always looked for a statement as to his ultimate results. That is to say, what is accomplished by the method? How long does the patient get an arrest of the symptoms? How long can we tell the friends she may expect to be in reasonable comfort before recurrence takes place or death ensues? I have not been able to find any statements of what we may expect by this method, and therefore I do not see, until we know something definitely about the ultimate results in these cases, how we can compare the treatment, as far as comfort of the patient is concerned, with the use of high heat as employed by Byrne and others. Therefore, while I have had only a small series of cases I am going to give a brief summary of the results so far as I have been able to ascertain them.

I have had 12 cases where I have been able to employ this method of Dr. Percy. In 8 of these cases the treatment was resorted to long enough ago to enable one to judge of the results so far as the temporary arrest of the disease is concerned. In the others the treatment was resorted to too recently to allow of deductions of much value to be made. Of these 12 cases, all were instances of carcinoma of the cervix except one which was a carcinoma of the vulva. In the eleven cases of carcinoma of the cervix I followed the technic of Dr. Percy as I saw him do it, opening the abdomen and employing heat precisely as described so well by Dr. Leonard just now. I do not think I can do any more than say that I think I accomplished just about what Dr. Leonard described, not using full heat, not

carbonizing, but having heat enough to cause discomfort to the assistant whose hand was in the abdomen. The cauterization was carried out in these cases from three-quarters to two hours. In the first five of these eleven cases there was no ligation of the vessels, but in the last six cases the internal iliacs and the ovarians were ligated to avoid the possibility of secondary hemorrhage, and to starve the growth.

The results in these cases, so far as I have been able to gather them, is as follows:

Case I.—Mrs. H., aged sixty years. Operation October 27, 1914. Extensive carcinoma of the cervix and vagina. The disease was so far advanced that it had invaded the walls of the vagina to such an extent that it was difficult to make a digital examination. Dr. Polak saw the case and can bear me out as to the conditions present when the patient came to me. It was impossible to introduce the water cooled speculum without first making Schuchardt incisions. She was cauterized for two hours.

In December 1915 she was able to come to New York from Freeport, L. I. for a day's shopping and as far as she knew, she was all right. She never knew that she had cancer. In March, 1916, I was called to see her as she had markedly failed since January. Examination showed that the disease had recurred and that she had only a short time to live. Death occurred May 14, 1916.

The result in this case was that she had had a full year of comparative comfort and freedom from symptoms, and the family felt that the year they had had her with them without suffering made the operation well worth while.

Case II.—Mrs. D., aged forty-one years. Operation March 29, 1915. Advanced carcinoma of cervix and vagina involving the entire vault, base of broad ligament and bladder. Cautery applied for one hour. There was an arrest of the disease for about six months and death occurred February 1, 1916.

Case III.—Mrs. M., aged fifty-three years. Operation April 16, 1915. The carcinoma was not so far advanced, it being macroscopically confined to cervix and base of the bladder. The patient was very obese, otherwise a Wertheim operation might have been possible. Cauterization for one hour.

On May 5, 1916, the patient was examined. There was no evidence of recurrence and no infiltration to be felt. She is in

excellent health and has a good color. Does all her own housework. She has a small vesicovaginal fistula at the vault of the vagina. The result in this case seems well worth while, as she has had a full year of freedom from symptoms to date.

Case IV.—Mrs. P. aged thirty-eight. Operation May 25, 1915. Patient was very fat. Extensive carcinoma of the cervix extending into the broad ligaments and vault of vagina, the mass being as large as the fist. Cauterization for one hour. Death November 3, 1915. The patient received little or no relief and was bedridden and suffered much from the time of the operation. The result in this case was without benefit.

Case V.—Mrs. G., aged forty-five years. Patient had symptoms for nine months prior to seeking relief in June, 1915, when a panhysterectomy was done by another surgeon, which left her with a ureteral fistula. In July, 1915, she came under the care of Dr. Furniss who did a cauterization, as she had an advanced carcinoma of the vagina.

On October 16, 1915, the disease having recurred, I operated. I attempted to implant the ureter but found it impossible owing to the extensive scar tissue. I cauterized her for one hour. On May 5, 1916 she was examined. There is an apparent arrest of the disease, although some infiltration could be felt. She feels fairly well and is perfectly comfortable, able to do light housework and takes short walks. The ureteral fistula has closed. She is taking *x*-ray treatments.

The result in this case has been six months of comfort to date, with an arrest of the progress of the disease.

Case VI.—Mrs. L., aged forty-five years. Advanced carcinoma of cervix and vaginal vault; Percy cauterization done by her family physician in August, 1915, but the abdomen was not opened. Operation October 26, 1915.

Internal iliacs and one ovarian artery ligated. Cauterization one hour. Examination in March, 1916, shows extensive recurrence with cachexia and the patient can live but a short time. The result in this case was that the patient had an apparent arrest of the disease for about four months.

Case VII.—Mrs. J., aged forty-three years; colored. Advanced carcinoma of cervix, vault and broad ligaments. This patient was in a deplorable condition, showing marked cachexia. Her hemoglobin was only 20 per cent. and red cells 2,500,000 ten days prior to operation. Therefore I thought best to

transfuse her, which was done by the citrate method. At the time of operation her hemoglobin was 26 per cent. and her red cells 4,000,000.

Operation December 21, 1915. Ligation of internal iliacs and ovarian arteries. Cauterization one hour. She left the hospital in a greatly improved condition and is alive with the disease in abeyance, but the time is too short (four months) to draw conclusions.

The remaining four cases were done in conjunction with Dr. Studdiford in our service at Bellevue Hospital since January, 1916, so that we are unable to give the ultimate results in all of them.

Case VIII.—Miss O'C., aged thirty-three years. Advanced carcinoma of cervix. Wassermann 17 units. Operation January 31, 1916. Ligation of internal iliacs and ovarians. Cauterization one hour. At this date she shows an improved general condition but has increasing pain. Vaginal walls are infiltrated and contracting. She is under radium treatment.

Case IX.—Mrs. M. L., aged forty-four years. Wassermann 15 units. Advanced carcinoma of cervix and vaginal vault. Operation February 7, 1916. Ligation of internal iliacs and ovarians. Left salpingo-oöphorectomy for hydrosalpinx; excision of lymph node at bifurcation of right iliac. Cauterization one hour.

Recent examination shows some thickening in right broad ligament. Feels well and goes to work every day and is free from symptoms.

Case X.—Mrs. M. R., aged thirty-six years. Wassermann 10 units. Advanced carcinoma of cervix and vault. Operation March 6, 1916. Ligation of internal iliacs and ovarians; injured internal iliac vein causing some difficulty in controlling the hemorrhage. Double salpingo-oöphorectomy for cystic ovaries. Cauterization for three-quarters of an hour. At the present time examination shows the vagina contracted and shortened, vault smooth, uterus small, pelvis negative. She has no pain and her general condition is improved. She goes to work each day.

Case XI.—Mrs. E. N., aged thirty-four years. Wassermann 15 units. Advanced carcinoma of cervix, vaginal vault and broad ligaments. Operation April 21, 1916. Ligation of internal iliacs and ovarians. Double Salpingo-oöphorectomy

for pyosalpinx. Cauterization for three-quarters of an hour. Patient died suddenly on May 5, 1916. Autopsy showed death caused by internal hemorrhage from sloughing of the internal iliac artery at point of ligation probably due to infection from the pyosalpinx which was ruptured during the removal.

The tissues are removed for study and we hope to be able to report on the effect of the treatment on the carcinoma cells beyond the immediate region of the cauterization.

CASE XII.—Epithelioma of vulva. Miss I. W., aged fifty-seven years. Patient suffered from pruritis and kraurosis vulvæ for eight or nine years prior to the time I first saw her. Operation on July 14, 1913. I made a complete excision of the external genitals with decided relief of her symptoms. The pathologist's report was negative, although there was a suspicious area.

In October, 1913, she noticed an enlarged inguinal gland, which on removal proved to be malignant. Recurrence in the scar of the excision operation promptly appeared and she was treated with radium in December, 1913. This proved of no avail and caused much suffering on account of extensive burns. In May, 1914, I operated with the Percy cautery, cooking the diseased tissues for an hour and a half with decided relief of symptoms. In August, 1914, it was necessary to again use the cautery and it resulted in an arrest of symptoms for about two months. She died in January, 1915.

Each use of the cautery in this case seemed to arrest the disease and give relief of symptoms for about two months.

So far as I have used this method, I am not convinced that we have any advantage from it over high heat. I have not yet satisfied myself that we can do any more with it than with the red hot cautery. That is the opinion I have formed, and the only advantage I can see in the method is that in those cases where there is involvement of the base of the bladder or rectum we can use low degrees of heat in those localities with a better chance of not having sloughing of the tissues than with high heat.

More reports are needed of the actual results obtained by both methods, in order that a comparative study may be made.

DR. WALTER W. CHIPMAN.—As a listener, I have enjoyed these papers and the discussion. I have been a member of this Society for ten years and have never been present at a

meeting where there was so much interest and such signs of virility as I have seen here this evening.

I have nothing in particular to add to what has been said. I am in the position simply of a man who is endeavoring to do the best he can in treating cancer. I think there is this to be said, that our one hope is in recognizing the disease early; and the early cases we had better subject to a radical operation. When we come to the palliative methods, I am using the Percy cautery to the best of my ability. I have only used it for the past year, therefore, I have no records of cases to present. Radium we have not used to any considerable extent. There is always promise in one thing after another, and yet each thing that promised so much in the beginning has disappointed us later on. It is astonishing always to me to see how we travel really in a circle, and that is, of course, inevitably so. Where we do not know the cause of the disease we are groping in the dark, and I think the scientific attitude is to try everything, prove everything and to hold only to that which is good.

Dr. Henry Schmitz.—I have been very much interested in the paper presented by Dr. Clark so far as the application of radium to uterine cancer is concerned.

I have had thirty-five inoperable, 12 recurrent and 16 operable uterine carcinomata, 7 inoperable, and 3 operable rectal cancers, and 5 inoperable, 2 recurrent and 1 operable carcinoma of the bladder. The total number is 80. These cases were treated between April 1, 1914, and April 1, 1916.

The results of the radium treatment differ, depending first, on the organ involved, and, second, on the stage of the disease. The prognosis is best in vesical cancers, less favorable in uterine malignant growths, and least favorable in rectal carcinomata.

The value of the treatment varies, depending on the operability, inoperability or recurrence of the disease. The time elapsed in all the cases enumerated was too short to permit of a discussion of the curative action of radium.

The therapeutic action of radium depends upon the use of a correct technic, based on a careful physical examination of the patient and the physical properties and the biological action of the metal. The use of massive Roentgen rays, according to multiple field and cross fire methods in conjunction with radium therapy to destroy metastases, is an imperative necessity. Certain surgical procedures must be used in radium

therapy to assist the action and facilitate the application of rays. The action of ray on cancer tissue is specific and suggests positive proof of the possibility of destroying malignant tumors by the application of radium. The results of radium therapy in inoperable and recurrent cancers surpass those of any other known therapeutic agent. The prophylactic use of radium rays in operable carcinoma increases the percentage of operability and probably the efficacy of the operative procedures.

Dr. Herman J. Boldt.—I would like to add one case to Dr. Clark's paper, namely, a case of recto-vesical-vaginal fistula following the use of radium after a period of six weeks. The radium was applied three or four times I think, and each time there was an application of twenty-four hours' duration. After a six weeks interval, after the last application, there was found a recto-vesical-vaginal fistula which has since been operated upon.

I may say clinically, so far as malignant disease is concerned, that the patient is better.

Dr. James F. Percy.—I am very grateful for the discussion on my paper, and especially am I grateful to Dr. Leonard for bringing up the case that he has reported here. If you will go back to the published reports of my work you will find that I discussed this very question that Dr. Leonard has brought up here tonight, only I put it under a different heading. I gave as the reason for these deaths the absorption of an overdose of broken down cancer cells. This is probably the same thing that Dr. Leonard has described.

In the beginning of my work where I had an enormous mass of cancer, where the whole pelvis was full, the Germans have a word that describes the condition very accurately, it seems to me, *Eingamaurt*, "cemented in." When you open the abdomen in such cases you cannot get the finger into the pelvis without force, you usually have to go in alongside the promontory of the sacrum. In these cases, where there is an enormous amount of cancer, I was afraid in my early work to apply this heat continuously. In one of these cases which I treated three years ago I destroyed a mass until there was only a mere shell left. I merely left a shell you could collapse with your fingers. The woman died after fourteen weeks.

A postmortem was made, and on serial sections of what was left in the pelvis we were not able to find any cancer cells.

This was reported to me by a very competent pathologist; but in the bottom of that woman's pelvis was about a pint of pultaceous material that was full of carcinoma cells, and I attributed her death to the slow absorption of this material. Since then I have destroyed in similar cases all I could of the mass at one sitting.

Regarding my statistics, I have not been so anxious to publish them. I lived through the days of getting up statistics in appendicitis operations, and I remember the things that we used to do in order to make statistics. I have been trying to avoid making mere statistics in the effort to develop a technic that really would finally make our patients live without any evidences of cancer beyond the three or four or five year period. I published some statistics in the first paper I read on this subject at which time I reported 13 cases. (*Jour. Am. Med. Assn.*, March 9, 1912). Last year in September, before the Pennsylvania State Medical Society in Philadelphia, I gave some more statistics but I did not give my complete statistics, I did however mention some of the patients that had lived from seven years down to two years. I have many of these otherwise utterly hopeless cases alive, and when I publish my results I am sure I will not be questioned regarding them in connection with this work.

What was said by Dr. Peterson in reference to stating to these people that they have an inoperable condition and they may as well take what they can get, is not altogether a bad thing. I have this matter thoroughly understood with all of my patients who have accepted the risk of operation, and I may say now that I completely destroy the cancerous mass even though they are on the table two hours. Since doing this I have had no experiences such as related here by Dr. Leonard. The thing that bothers me most in the majority of my cases is getting the iliac arteries. They are not easy to ligate in many cases, especially if the woman is fat. Many of my patients are kept on the table because of the difficulty of this ligation rather than because of the actual application of the heat.

I want to say in reference to Dr. Leonard's statement which he gave as evidence that he thoroughly applied the heat, that I never accept my asistant's statement as to the thoroughness of the application of the heat until he begins to complain that

he absolutely cannot hold the uterus longer. In other words, I make the uterus so hot that he cannot hold it. It is not "warm" as described by Dr. Leonard. Practically all uteri to which I apply heat are changed to the color of a blue plum. None of these cases have had a thorough application of heat unless you produce an œdema of the serous surface of the uterus. You only get that when you make the uterus so hot that you really cannot hold it any longer. When my assistant insists that he cannot hold the uterus any longer, I still hesitate about discontinuing the application of the heat.

I have had seven cases in which what was left of the uterus has sloughed out or come away after the application of the heat, and in some of these cases I have had some very striking results.

As Dr. Boldt has suggested in reference to proving the fact that you get uterine cancer situated high up, I have slides of all these cases in which I have taken out the mass or masses in the pelvis, and especially the glands along the iliacs, and have confirmed in this way the pathology of my cases. Therefore, so far as my own work is concerned, that point can be easily settled.

I think it is begging the question a little to pass doubt on the work at the Mayo Clinic when, as they reported to me, not long ago that they had had 20 cases of truly inoperable carcinoma, in 16 of which, after doing a hysterectomy from 4 to 11 months later they could find absolutely no carcinoma cells except in four instances. Dr. MacCarty told me that I could be assured that they tried absolutely and carefully to find carcinoma in every one of these cases because they wanted to disprove the value of the technic if it were possible to do so.

Clark, of New Orleans, has made serial sections in the same way with the same result.

Dr. Leonard asked in reference to air hunger. I have not seen it in any of my cases. In the majority of my cases, those that have been on the operating table for two or more hours, it is a not uncommon experience for them to complain the next morning they have not had their breakfast. They endure this treat without vomiting, without pain and without discomfort. This is absolutely true and can be verified in a great many of the cases.

There is one very important thing that is overlooked by the

men treating pelvic carcinoma by this technic. The statistics of very well organizaed clinics, where they have made serial sections of their cases dying from carcinoma, reveal that 47 per cent. show no metastases outside of the pelvis. Dr. John B. Murphy says that it is in this type of case I get my results, and that I am bound to get results.

I hinted at something in my paper and I want to refer to it again here it is this: We do not yet know the full possibilities of the use of heat in carcinoma. I have gotten on (if I may use that expression) to a method of applying heat which I am not yet quite ready to give to the profession, but if it holds good in a larger series of cases as seems to be true in a small number I believe we have gotten something of extreme value. You can apply heat in a way that will destroy carcinoma that is so simple that it is almost beyond belief. Ewing, of New York, a few years ago made the statement that the "balance in cancer was easily upset," which is one of the truest things in cancer that I know of. I hope that this technic which I expect to announce later will prove the thing that will easily upset cancer especially in the cavity form of the disease. Dr. Reuben Peterson, Ann Arbor, Michigan: Since my paper has not been discussed, I would like to say a few words regarding the treatment of inoperable carcinoma of the uterus by the cautery, in other words, by heat.

I think I was one of the first men to invite Dr. Percy to demonstrate his method at the University Clinic. After his demonstration I saw at once the advantages of guiding the cautery by means of the assistant's hand within the abdomen and I have been using the method ever since for cases of uterine cancer which are hopeless,—which cannot be operated upon but which must be helped. I am satisfied the Percy method is superior to the method I formerly employed,—curettage and the application of a strong solution of chlorid of zinc. The application of the latter caustic would bring away a coat of the uterus, and would stop the progress of the carcinoma for a time, but the pain following this method of treatment was so much greater than after the use of the cautery as advocated by Dr. Percy, that I prefer the latter method in the treatment of inoperable uterine carcinoma.

However, let us keep clearly in mind what the cautery can and cannot do. It can help the woman with inoperable uterine

cancer. It will not cure her except in the very rare case where we are dealing with a very slow growing type of cancer. Once in awhile we meet with such a case where even curetting may cure. But such cases are so rare as to be almost neglible.

That is as much as we can expect from the use of the cautery by the Percy or any other method. It will stay the progress of the disease for a time; it will make the woman better but it will not cure. Sooner or later the disease returns and the woman dies, no matter whether you have used high heat or low heat. Neither will reach far enough out into the parametrium to destroy the cancer cells.

I protest against confusing the issue, of talking about some mysterious something, a heat applied by the cautery which will cure uterine cancer. From an experience of sixty or more patients with inoperable uterine cancer treated by the Percy method, as demonstrated by its originator, I can emphatically state that it does not cure; it helps but does not remove the disease.

During the past four years I have seen in my University and private clinics 124 cases of uterine cancer, almost all of them inoperable. A great many of these women I have helped by the cautery treatment. Because of such treatment they will suffer less and live longer but they will all die sooner or later of carcinoma.

The radical operation for uterine cancer, on the other hand, does cure the patient, in a certain proportion of cases. Not in as many cases as we could wish, but certain women remain alive and well after five years. I must insist that the same rigid rules be applied to the results of Dr. Kelly and Dr. Percy as are demanded of me in reporting the results of my radical operations. Let both these gentlemen show how many patients are alive after their methods five years after the treatment is employed.

Dr. Kelly speaks of one patient treated seven years ago by radium and well at the present time. He says he hopes the patient will remain well. If there has been no cancer for seven years he is justified in thinking it has been destroyed by the radium. But we will wait before deciding as to the value of the treatment until he has reported upon all his patients treated by radium. If Dr. Kelly will show that 50 per cent. of his patients with carcinoma of the uterus are well five years

or longer after the use of radium he will have gone far in convincing us that radium is a curative, not a palliative treatment in carcinoma of the uterus.

Dr. Percy says he does not like to give the statistics of his cases treated by the cautery method. No one is proud of his cancer statistics but he gives them just the same. Even if the cautery patients be all dead after five years, as they all will be with a possible exception now and then, it will only prove that the cautery treatment is useless as a curative measure. It will not mean that these poor victims of cancer have not been helped, for even if we cannot cure it is our duty to help in every way in our power.

Dr. John G. Clark.—I have very little to add to what has been said. I, however, feel that the results which I have gotten from the use of radium are promising to say the least. As Dr. Peterson has said, we are waiting for Dr. Percy's statistics so that we may compare them with the results obtained by other methods of treatment, but until the other methods of treating carcinoma present as good results in the border-line and inoperable cases, I shall continue to employ radium, which has given such excellent results.

Dr. William S. Stone, New York City (closing).—I am very much in the same position as Dr. Peterson, as little reference was made to my paper in the discussion, but perhaps a little more favorably. I think the interest in the discussion has centered more on the terminal stages of the disease than on its inception.

ABDOMINAL MYOMECTOMY AND HYSTERO-MYOMECTOMY BY MORCELLATION

By Charles Gardner Child, Jr., M.D.
New York

In the surgical treatment of the fibroid uterus the multiplicity of the tumors and the large size of the tumor mass often add very materially to the difficulty of removal. "The larger the tumor the larger the incision" is the time-honored dictum. That these operations may be greatly facilitated by decreasing the bulk of the tumor mass as the removal proceeds, and that this method of removal means greater safety to the patient, are the two points I shall endeavor to bring out in this paper.

Ordinarily, these tumors are removed through a large median line incision—the size of the incision being proportionate to the size of the growth. The intestines are then packed out of the way with laparotomy pads, the uterus delivered and myomectomy or hysteromyomectomy performed, as the case may be. This method of procedure has the following objections:

1. A large median line incision gives a high percentage of postoperative hernia, both primary and secondary, and there is great exposure of the abdominal viscera during the operation.

2. Laparotomy pads, traumatize the intestines, adding to the danger of ilius and postoperative infection. Exposure and traumatism of the viscera are of very grave importance,

and in every abdominal operation should be reduced to the lowest possible minimum. Laparotomy pads, always a menace to the patient, are unnecessary in many abdominal operations, and in the removal of fibroids they constitute a needless insult to the viscera.

The operative technic for the treatment of the fibroid uterus that I have the honor to present for your consideration is as follows:

Incision. As the size of the tumor decreases with its removal, a large incision is unnecessary. I, therefore, use the transverse suprapubic incision, 3 to 5 inches in length. The transverse incision is the one of election for three important reasons: first, because it gives a maximum exposure of the field of operation with a minimum exposure of the abdominal viscera—the intestines lie well protected by the upper flap; second, because of the freedom from postoperative hernia; and third because it yields a higher percentage of primary union than does the median line incision.

The method of making and closing the incision is as follows:

With the patient in the Trendelenburg position, a transverse incision 3 to 5 inches in length is made in the edge of the suprapubic hair, or in the transverse skin fold usually found just above it. A straight cut is used rather than a semilunar one, because experience has shown that it severs fewer bloodvessels, giving rise to less hemorrhage and causing less interference with the subsequent nutrition of the flaps. It is seldom necessary to ligate more than two or three vessels in the wound, and often no ligatures at all are needed, thus greatly reducing the amount of foreign material introduced into the wound, all of which has an important bearing on wound-union.

The wound is now stretched with the fingers, thereby slightly enlarging it and better exposing the underlying fascia. After operation, contraction back to the original size of the cut occurs. The fascia is next incised in the same direction,

and to the same extent, 1 to 2 inches above the symphysis pubis. The extent of the fascial incision to either side should be limited by the outer borders of the recti muscles, and if a larger opening is required, the incision should be curved upward, or follow the outer borders of the rectal sheaths directly upward, to avoid injury to the external rings. Dissecting the fascial flaps free from the underlying muscles, which can readily be done by blunt dissection with the finger (from the linea alba they must be cut with the scissors), discloses the two recti overlapped by the pyramidales. The right pyramidalis is separated by its outer edge from the underlying rectus but not from the linea alba, and retracted to the middle line. Under this the rectus is separated from the middle line and retracted outward.

The peritoneum now lies exposed, and the abdominal cavity is opened by a vertical incision. The lower flap is retracted by a self-retaining retractor, preferably that of Doyen, and the upper one by a small movable abdominal retractor.

These are the only permanent retractors required. Of great assistance during the remainder of the operation are two Pryor trowels, which make possible perfect retraction in what would otherwise be inaccessible portions of the operative field, and which can be made to illuminate many a dark area with light reflected from their polished concave surfaces.

When the operation is completed, the wound is closed in three layers—the peritoneum, fascia, and skin.

The peritoneum is brought together by a continuous suture of fine silk. The fascia is united by a running quilted stitch of medium sized silkworm gut, or silver wire drawing the raw edges together without undue tension, and instead of being tied the ends are brought out through the skin and left long near the angles of the wound.

The incision in the skin is closed by a continuous subcuti-

cular stitch of silkworm gut, or silver wire and the ends are also brought out long through the skin near the angles of the wound, but on the opposite sides from the fascial stitch.

A firm roll of gauze, one inch thick, and slightly longer than the wound, is now laid over it, and over this, at each end, the skin and fascial stitches are fastened together, just tight enough to take up any slipping that may have occurred since their introduction. At the first dressing on the second day the gauze between the sutures is cut out so as to allow subsequent daily inspection of the wound.

At the end of the second week the sutures are unfastened, releasing the remaining ends of the gauze roller, and the skin stitch is cut off at one end and drawn out. The fascial stitch is removed in a similar manner, thus leaving no suture material behind in the wound between the peritoneum and skin.

In case there is failure on the part of the wound to heal by primary union the skin stitch should be withdrawn and the fascial incision inspected. If this shows infection, or if the infection is under the fascia, its edges can be readily separated by loosening the suture without removing it, and proper drainage secured. Later, when the infection has subsided and union begun the edges of the fascia can again be drawn together and good approximation obtained. Thus, the introduction of secondary sutures to close the separation in the fascia, so often observed following suppurating wounds, and such a frequent cause of postoperative hernia, is avoided, saving much annoyance to both patient and surgeon.

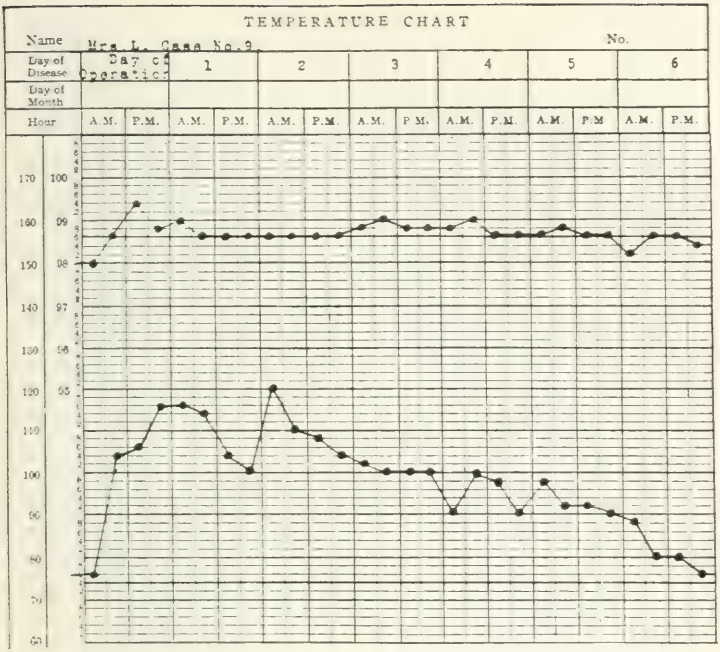
With the peritoneal cavity open, and the wound properly retracted above and below, the pathological condition is studied, and the question of myomectomy or hysteromyomectomy decided. The tumor mass is then grasped with two heavy traction forceps, held in close apposition with the abdominal wall and morcellation begun. Small tumors are enucleated and removed entire, while those too large to

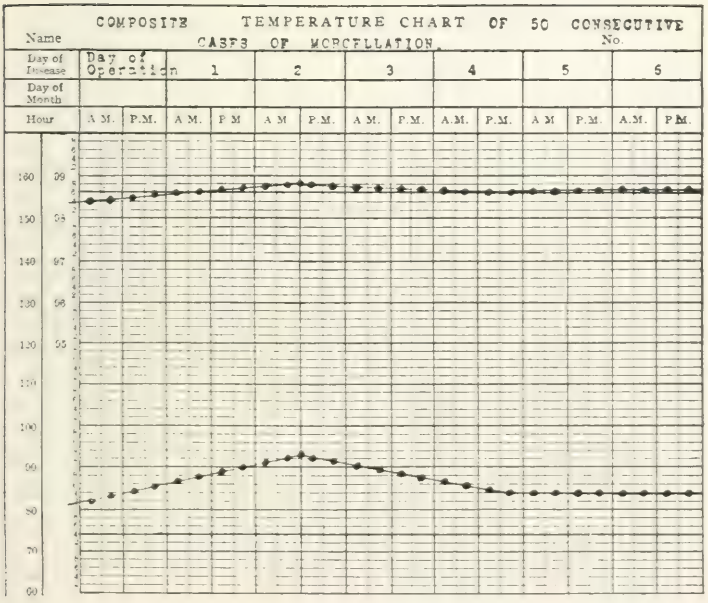
pass through the incision are divided. The subtotal or total removal of the uterus is greatly facilitated by first removing the fibroids. This decreases the bulk of the tumor mass, and, as the operation proceeds each successive step becomes progressively easier. With the reduction in size of the tumor comes relaxation of the broad ligaments, making their subsequent ligation as easy and certain as in uncomplicated cases. To fully appreciate what I mean by this it is but necessary to contrast the difficulty experienced in ligating the tense over-stretched broad ligaments of a large fibroid uterus *in situ* with the ease attending the same procedure in a case of uterine prolapse, where great laxity of the ligaments exists. When the growth is a very vascular one, or when it is desirable to save all blood possible to the patient, as in cases of grave secondary anemia, control of the blood supply to the tumor is first obtained by separating the peritoneal reflection of the bladder at the uterus and ligating or clamping the uterine arteries on either side, before the actual removal of the growth is begun. By this procedure the blood contained in the tumor, returning through the uterine veins, is saved to the patient, and the operation is easier because of the freedom from bleeding, and the shrinkage of the tumor consequent upon its venesection. As a rule the amount of blood lost during removal by morcellation is no greater than by the removal en masse—it is the residual blood of the tumor only that is lost. During the process of morcellation the tumor mass is kept constantly in contact with the abdominal wall. This excludes the intestines from the field of operation, preventing their injury or prolonged exposure, and eliminates the traumatism of laparotomy pads. As the operation is largely extraperitoneal, the convalescence is proportionately smooth. There is a notable freedom from distention, and the danger of subsequent adhesions is minimized. When adherent viscera are encountered they are drawn up into the wound and

separated under the eye, where they can be easily and safely dealt with. As the morcellation proceeds the tumor decreases in size, the round and broad ligaments relieved of tension relax, and it now becomes easy, when hysteromyomectomy is being done, to deliver the uterus through the wound, and proceed as in an uncomplicated case.

As an additional argument for the operation described, I beg leave to present to you a series of fifty cases from my records, with a brief analysis of some of their most salient points. These are consecutive and not selected cases, and, while the number is comparatively small, yet I feel that the series cover pretty well the field of fibroid pathology, and give a very good idea of the value of this technic.

In every one of the cases operated upon the size of the growth would have prohibited its removal en masse, except through a very large incision. In 23 cases, nearly one-half, the tumor mass reached to or above the umbilicus. In case No. 14, the largest and most difficult single fibroid of the series, the tumor reached well above the umbilicus, entirely filled the pelvic and most of the abdominal cavity. To have removed it entire would have necessitated a median line incision reaching well above the umbilicus, many laparotomy pads would have been required, and there would have been great exposure and traumatism of the intestines, making the convalescence proportionately stormy. Instead, a 5 inch Pfannenstiel incision was used, no laparotomy pads were required, and the only intestinal exposure necessary was for the separation of the adhesions, as they were drawn up into the wound, note how smooth was the convalescence in this case. A maximum elevation of only 1° in temperature, and 8 beats of the pulse, occurring on the evening of the operation; the temperature was normal on the first day, and thereafter. There was no abdominal distention, and normal action of the bowels occurred on the third day.


TEMPERATURE CHART
Name Mrs. L. Case No. 9.
No.
Day of Disease
Day of Operation
Day of Month
Hour
A.M. P.M.
1
2
3
4
5
6
170 100
160 99
150 98
140 97
130 96
120 95
110
100
90
80
70
60


COMPOSITE TEMPERATURE CHART OF 50 CONSECUTIVE CASES OF MORCELLATION.
Name
No.
Day of Disease
Day of Operation
Day of Month
Hour
A.M. P.M.
1
2
3
4
5
6
100 99
98
97
96
95
90
80
70
60

Again, in case No. 9, a hysteromyomectomy for multiple tumors reaching well above the umbilicus, complicated and prolonged by unskilled assistance, yet there was only 1.4° elevation of temperature and 28 beats of the pulse on the same evening; normal on the first day, and thereafter. (See chart.)

Age. The youngest patient was aged twenty-seven years, the oldest aged fifty-six years, the average being thirty-eight years.

A transverse suprapubic incision was made in all but two cases. In these the patients had been previously operated upon through a median line incision, and the same was repeated.

Complications. *Operative.* Chronic adnexal disease was encountered in 22 per cent. of the cases: Myomectomy was performed 9 times and hysteromyomectomy 41 times.

Adherent appendix	19 cases
Retrodisplacement	2 "
Intraligamentous cyst	2 "
Fibroids:	
Twisted pedicle	2 "
Acute inflammation	1 case
Calcareous degeneration	3 cases
Necrosis	4 "
Early pregnancy	1 case

Of the Convalescence. One case of pneumonia developing on the tenth day.

The average maximum elevation of temperature and pulse after operation was $\frac{4}{10}$ with 11 beats of the pulse, occurring on the second day. The average day on which the temperature became normal was the fourth. Primary union in the abdominal wound occurred in every case. There were no deaths.

ABDOMINAL MYOMECTOMY AND HYSTEROMYOMECTOMY BY MORCELLATION. FIFTY CONSECUTIVE CASES.

No.	Name.	Age.	Lesion.	Associated lesions.	Operation.	Remarks.
1	Miss M. B.	38	Single tumor	Uterine fibrosis	Hysteromyomectomy	
2	Mrs. M. H.	27	Single tumor	Uterine fibrosis	Hysteromyomectomy	Calcareous degeneration.
3	Mrs. H. K.	32	Multiple tumors	Retroversion; chronic salpingitis	Myomectomy; round ligaments shortened	Calcareous degeneration in two tumors.
4	Mrs. J. R.	52	Multiple tumors	Chronic salpingitis	Hysteromyomectomy; salpingectomy	Twisted pedicle in one tumor.
5	Mrs. T. C.	27	Single tumor	Uterine fibrosis; diseased adnexa; chronic appendicitis	Hysteromyomectomy; right salpingo-oöphorectomy, appendectomy	
6	Mrs. E. B.	35	Single tumor	Uterine fibrosis	Hysteromyomectomy; appendectomy	
7	Mrs. B.	46	Single tumor	Uterine fibrosis	Hysteromyomectomy	
8	Miss A. G.	29	Single tumor	Uterine fibrosis chronic appendicitis	Hysteromyomectomy; appendectomy	Tumor undergoing necrosis.
9	Miss M. L.	41	Multiple tumors	.....	Hysteromyomectomy	
10	Mrs. C. M.	38	Multiple tumors	Uterine fibrosis; ovarian cyst	Hysteromyomectomy; oöphorectomy; salpingectomy; appendectomy	
11	Mrs. G. W.	38	Multiple tumors	Uterine fibrosis; diseased adnexa	Hysteromyomectomy; salpingectomy	
12	Miss McC.	41	Multiple tumors	Uterine fibrosis	Hysteromyomectomy; oöphorosalpingectomy; appendectomy	One tumor undergoing necrosis.
13	Mrs. K. G.	27	Multiple tumors	4 months pregnancy	Hysteromyomectomy; oöphorosalpingectomy	Several tumors undergoing degeneration.
14	Mrs. E. P.	31	Single tumor	Chronic appendicitis	Myomectomy; appendectomy	
15	Mrs. McD.	37	Single tumor	Uterine fibrosis; adherent adnexa	Hysteromyomectomy; oöphorosalpingectomy	
16	Mrs. E. H.	49	Multiple tumors	Uterine fibrosis;	Hysteromyomectomy; perineorraphy	
17	Mrs. A. C.	35	Multiple tumors	Uterine fibrosis; oöphorauxe	Hysteromyomectomy; oöphorosalpingectomy	
18	Mrs. M. A.	51	Single tumor	Uterine fibrosis	Hysteromyomectomy; oöphorosalpingectomy	
19	Miss A. H.	34	Multiple tumors	Retroversion	Myomectomy; round ligaments shortened	
20	Mrs. G. T.	42	Multiple tumors	Uterine fibrosis	Hysteromyomectomy; salpingectomy	
21	Mrs. A. W.	34	Multiple tumors	.....	Hysteromyomectomy; salpingectomy	Myoma sarcomatoides.
22	Mrs. J. F.	56	Multiple tumors	Parovarian cyst	Hysteromyomectomy; oöphorectomy	
23	Mrs. J. H.	38	Multiple tumors	.....	Hysteromyomectomy	Calcareous degeneration with central necrosis.
24	Mrs. D.	38	Multiple tumors	Bilateral hematosalpinx; chronic appendicitis	Hysteromyomectomy; salpingectomy; appendectomy	
25	Mrs. J. D.	35	Multiple tumors	Adherent adnexa	Hysteromyomectomy	
26	Mrs. A. W.	47	Multiple tumors	Uterine fibrosis	Hysteromyomectomy; salpingectomy	
27	Miss J. M.	37	Multiple tumors	Chronic appendicitis	Hysteromyomectomy; salpingectomy; appendectomy	Retrocecal appendix.

ABDOMINAL MYOMECTOMY AND HYSTEROMYOMECTOMY BY MORCELLATION—*Continued.*

No.	Name.	Age.	Lesion.	Associated lesions.	Operation.	Remarks.
28	Miss V. F.	42	Multiple tumors	Uterine fibrosis	Hysteromyomectomy	
29	Mrs. A. R.	45	Multiple tumors	Chronic appendicitis	Hysteromyomectomy; appendectomy	
30	Mrs. F. P.	36	Multiple tumors	Chronic appendicitis	Hysteromyomectomy; oöphorosalpingectomy; appendectomy	
31	Miss K. H.	43	Multiple tumors	.....	Hysteromyomectomy	One tumor with twisted pedicle.
32	Mrs. M. H.	56	Multiple tumors	.....	Hysteromyomectomy	
33	Mrs. R. S.	42	Multiple tumors	Adherent adnexa	Hysteromyomectomy; oöphorosalpingectomy; appendectomy	
34	Mrs. C. T.	46	Multiple tumors	Uterine fibrosis; secondary anemia	Hysteromyomectomy; perineorraphy	
35	Mrs. A. L.	34	Single tumor	Uterine fibrosis; hydrosalpinx	Hysteromyomectomy; salpingectomy; appendectomy	
36	Mrs. M. S.	40	Multiple tumors	Uterine fibrosis	Hysteromyomectomy	
37	Mrs. E. S.	34	Multiple tumors	.....	Hysteromyomectomy; salpingectomy; right oöphorectomy; appendectomy	
38	Mrs. A. P.	31	Multiple tumors	.....	Hysteromyomectomy	
39	Miss R. C.	34	Single tumor	.....	Myomectomy	
40	Miss A. B.	36	Multiple tumors	Chronic appendicitis	Myomectomy; appendectomy	One tumor submucous uterine cavity opened during removal.
41	Mrs. M. W.	52	Multiple tumors	Uterine fibrosis; adherent adnexa; cervical polyp	Hysteromyomectomy; oöphorosalpingectomy. Removal of polyp	
42	Mrs. M. N.	34	Multiple tumors	Salpingitis	Hysteromyomectomy oöphorosalpingectomy	
43	Mrs. A. W.	45	Single tumor	Hydrosalpinx; oöphorauxe	Hysteromyomectomy; salpingectomy; right oöphorectomy	
44	Mrs. T. B.	29	Single tumor	Retroflexion salpingitis	Myomectomy; right salpingectomy; round ligments shortened	
45	Mrs. O. S.	47	Single tumor	.....	Hysteromyomectomy	Acute inflammation of fibroid.
46	Miss S. M.	33	Single tumor	.....	Myomectomy	Tumor of cervical origin and retroperitoneal.
47	Miss D. B.	26	Single tumor	Retroversion; chronic appendicitis	Myomectomy; appendectomy; round and uterosacral ligaments shortened	
48	Mrs. R. B.	50	Multiple tumors	.....	Hysteromyomectomy; oöphorosalpingectomy	
49	Miss A. G.	32	Multiple tumors	Uterine fibrosis; adherent adnexa; chronic appendicitis	Hysteromyomectomy; right oöphorectomy; salpingectomy; appendectomy	
50	Mrs. M. S.	36	Multiple tumors	Diseased adnexa	Hysteromyomectomy; oöphorosalpingectomy; appendectomy	Two tumors undergoing necrosis.

Conclusions. The advantages of myomectomy or hysteromyomectomy by morcellation are many. The original morcellation by the vaginal route enjoyed great popularity because of the smoothness of the subsequent convalescence and freedom from postoperative complications, both immediate and remote. The abdominal removal of these tumors by morcellation now that we have today so improved our abdominal technic, gives just as smooth a convalescence and just as great a freedom from complications as was secured by the vaginal operators in the past.

The advantages of the technic which I have above outlined may be considered both from the point of view of the patient and of the surgeon. To the patient it affords greater safety, a shorter and a smoother convalescence. This is by reason of the fact that as the surgeon works practically extraperitoneally the intestines are kept out of the way without resource to laparotomy pads, thus is the intraperitoneal traumatism minimized and postoperative shock, distention or peritonitis is seldom, if ever, seen. In hysteromyomectomy the danger of secondary hemorrhage from slipped ligatures on the broad ligaments is very materially decreased because of the ease and safety with which the relaxed broad ligament can be ligated. The smaller incision and the stronger resulting scar, especially when the transverse incision is used, reduces to a minimum the danger of hernia. The high percentage of primary union resulting when the transverse incision, closed with non-infectable suture material, means a much shorter hospital residence. A large granulating median line incision where primary union has not been secured means a prolongation of the convalescence by many weeks, with a good prospect of a subsequent hospital stay when the ventral hernia, almost certain to occur in such a case, is operated upon.

The Advantages to the Surgeon. During the greater part of the operation the tumor is in contact with the abdominal

wall, and the work is extraperitoneal. Thus is the surgeon able to see definitely each pathological condition as it arises, and to take the necessary time to meet the indication, for by this technic the length of time which the patient is under the anesthetic is not nearly of the importance that it is when a large median line incision has been made with all the consequent exposure of intestines, and use of laparotomy pads that go with the older technic. In hysteromyomectomy the ease with which the broad ligaments can be ligated, and the cervix removed when a complete hysterectomy is necessary is very marked. Although the transverse suprapubic incision may be so small as to handicap many an operator at the start, still as skill in anything is acquired only by repetition, so here with experience one becomes quickly proficient.

DISCUSSION

Dr. J. Riddle Goffe.—I have seen Dr. Child use this method in a number of instances and I desire to bear testimony to the statements he has made. His success in drawing the tumor up so that it fills the incision and prevents any prolapse of the intestines, is very striking in his work. The ease with which he does it, and the facility, as he has explained by which the broad ligaments are reached and the ligatures applied after the tumor or tumors have been removed, we can all appreciate. I resort to morcellation at times in cases where the broad ligaments are short and there is difficulty in reaching them. I find it facilitates very much the application of the ligatures to celate a tumor or shell out small tumors and get them out of the way at the beginning of the operation.

Dr. Thomas J. Watkins.—I think the doctor might have some trouble in establishing the advantages which are claimed for the transverse incision. Complications of pathology in the upper abdomen, and routine removal of the appendix favor the median incision. This is especially true, in very large fibroids because they frequently have complications.

Intraligamentary fibroids, especially the ones that are very inaccessible by the ordinary method, can be handled very satisfactorily by incising the capsule on the uterine side and by making partial enucleation. The partial enucleation will free the broad ligaments so as to make them accessible without causing bleeding.

Incision through the cervix from behind forward is often of great advantage as it saves time and lessens the danger of injury to the bladder and is attended by little or no bleeding.

Dr. F. F. Simpson.—It seems to me that Dr. Child has given us a valuable suggestion; one which has definite bearing upon the technic of abdominal surgery in general. We all realize the dangers of traumatizing the peritoneum and the need for handling it as gently as possible. Almost all of us have many times used pedunculated fibroid tumors and ovarian cysts as pads for the purpose of packing the abdominal contents out of the way, by simply pushing the tumor up while ligating and severing the pedicle and then slipping the neoplasm out.

I would doubt the wisdom of the general employment of very small incisions by men who are not as expert as those here present. Unless one has had a large experience, he might readily open into an infected fibroid or injure important structures such as ureters or uterine vessels, when normal anatomic relations have been disturbed by the neoplasm.

I feel, however, that the essayist has added a very definite advance in technic and that by making a systematic review of our technic in connection with all well established operations, we will doubtless find many other instances in which we can materially reduce the immediate risk as well as the probability of annoying postoperative complications.

Dr. Charles G. Child, Jr. (closing).—There are only one or two points to answer, the first of which was brought out by Dr. Watkins in regard to the trouble that might arise from the transverse incision not giving a good exposure of the upper abdomen. There are very few cases where it is necessary to gain such greater exposure of the upper abdomen and in these the transverse incision, by extension up along the outer border of the rectus muscle can be made to yield ample exposure to meet any complication that may arise. The high adhesions are dealt with as the tumor mass is drawn down to the wound; it is unnecessary to go up to the fundus of the tumor to gain access to them.

The anterior flap I do not consider important, and I do not make a separate anterior flap where I shut off the blood supply of the tumor at the beginning of the operation described. I make a transverse incision at the bladder reflection long enough to get at the uterine artery to control the blood supply which saves a considerable amount of blood to the patient and also reduces the size of the tumor very materially, making its subsequent removal far easier.

Dr. Simpson mentioned an objection to this technic in unskillful hands. I considered in the preparation of my paper that it was to be read before a society of specialists. However, I think the man who is not expert will do the least damage with this sort of technic if he understands the rudiments than with a large abdominal incision in the median line, where to keep the intestines inside the abdomen he has to resort to the use of numerous laparotomy pads. One operator recently told me that he had great success with the use of Turkish bath towels. (Laughter.)

Infected cases are not a contra-indication to morcellation. In this series there were four cases of fibroids undergoing gangrenous degeneration, as determined both microscopically and macroscopically. The appendix can be removed with ease. In 19 of the cases the appendix was a complicating factor sometimes being retrocecal, which is easier to reach through a transverse incision than through an incision over the caput. A transverse suprapubic incision approaches the appendix at an angle of 45°; the caput is elevated sufficiently to reach the appendix, and the appendix even when retrocecal, is removed with far greater ease than through an incision made directly over the caput.

A STUDY OF THE PATHOLOGY IN ITS RELATION TO THE ETIOLOGY WITH THE END RESULTS OF TREATMENT OF STERILITY

By John Osborn Polak, M.D., F.A.C.S.
Brooklyn, N. Y.

Probably no question is of such sociological significance to the gynecologist as that of sterility. Homes are wrecked, lives are sacrificed, and fortunes lost, all because of the inability of a woman to conceive or to successfully bring forth the fruits of her conception. Certainly no subject taxes the resourcefulness and ingenuity of the gynecologist more. Do what we will, many women from one cause or another are destined to remain fruitless.

It would seem from an extensive study of our case records that the number of sterile women is increasing; at least an increasing number are applying for relief; yet a large majority of those who apply present such gross lesions that little or nothing can be done to help them.

We may define sterility as the inability on the part of a woman to produce a living child. This inclusive definition is propounded in order that we may include in this discussion the part which syphilis plays in the etiology. Sterility may further be divided into the so-called primary sterility, where the woman has never been pregnant, and the secondary type where she has borne a child or has had a miscarriage and remains sterile thereafter. *In this study, which is a personal review of seven-hundred and ninety-eight*

case histories of patients from the writer's private practice, we will attempt first to analyze the many etiological factors which have entered into the causation of this symptom; *second*, to discuss the treatment of the individual case based upon an etiological diagnosis, and *finally* summarize our end results, in the hope that this contribution may add something to this already overwritten but unsolved subject.

It must be primarily admitted that conception depends *first* upon the perfect consummation of the sexual act; *second*, on the proper fecundation of the ovum, and *third* on the proper nourishment of the impregnated ovum during its growth and development after its final location in the decidual bed. It is thus apparent that certain conditions are essential for conception. Findley has tersely summarized these as follows:

1. The deposit of semen containing active, living spermatozoa in the upper portion of the vagina.

2. The passage of the healthy spermatozoön to the ovule, through the cervix, into the cavity of the uterus and into the tube.

3. A healthy ovum which has uninterrupted transit from the ovary, and after impregnation through the tube into the uterine cavity.

4. A decidual bed for the impregnated ovum to find a permanent resting place in the endometrium until the period of viability.

These conditions entail a healthy male, producing a healthy, active, well developed spermatazoid with long cilia and capable of rapid movement through the semen. Furthermore, the seminal discharge must be free from infective bacteria. For these reasons, the husband of each woman in this series has been subjected to a most exacting examination by a competent urologist. This examination has not only included an investigation as to his potency but as to the presence of past or present infective disease. *The*

passage of the spermatozoön through the cervix is dependent upon the activity of the particular spermatazoön and the amount, character and reaction of the glandular secretion from the cervix. Acids in very weak dilutions are destructive to the spermatozoa and thick mucopus acts as an almost insurmountable barrier to the progress of the male element.

Proper ovulation depends on the efficiency of the individual ovary. *This implies a healthy egg bearing area and the free delivery of the ovule through the ovarian tunic.* Consequently conditions which have resulted in a thickening of the tunic militate against conception. *Chronic inflammatory changes, prolonged acute infection, fatty degeneration, tumors, adhesions and senile atrophy* all impair the egg producing quality of the ovary as well as tend to thicken the tunic to such an extent that ovular rupture may be prevented.

The proper transit of the ovum from the ovary to the uterus *requires a healthy patent fallopian tube.* Fecundation is supposed to take place at the outer end of the Fallopian tube, from whence the impregnated ovum is propelled along the course of the tube into the uterus, where the endometrium has been prepared by the development of a decidua for its reception and permanent nutrition. Hence, *conditions which interfere with this free transit may be accepted as causes of sterility.* While a tube may not be patent to an impregnated ovum, its lumen may still be sufficient to allow the passage of the spermatozoön, and impregnation of the ovule in its distal portion. This is shown by the great frequency of tubal pregnancies, occurring after long periods of sterility which were due to chronic inflammatory disease.

The conditions of the tube which may impair the transmission of the impregnated ovum are either congenital or acquired. Of the former we may mention tortions, constrictions, angulations, and diverticula, while acquired lesions are commonly the result of inflammatory processes, which either occlude the lumen or destroy the epithelial lining of the tube, or

produce peritubal adhesions which distort the tube and thus prevent the passage of the ovum.

On arriving in the uterus *the impregnated ovum locates in the decidual bed prepared for its nourishment*, which is usually situated just below the uterine ostium of the tube on the anterior or posterior wall of the uterus, and unless the endometrium has been the seat of disease, the ovum develops at the site of its primary implantation. Syphilis of the endometrium may prevent implantation of the ovum or cause its early discharge from the uterus. Circulatory derangements which produce *hyperplastic and fungoid changes in the endometrium contribute largely to the unrest of the ovum*. These circulatory changes may be produced by displacements, fibroid tumors, sexual excesses, lacerations, and subinvolutions, and result in a endometrial hyperplasia. *Such conditions change the character of the uterine secretion, producing toxic discharges, from the involved surfaces of both the body and cervix, which may cause the death of the sperm cell*, and thus produce another factor which is antagonistic to the occurrence of pregnancy.

The foregoing may therefore be considered the essential factors in the fecundation and the development of the impregnated ovum. Hence, it may be deduced that where any of these elements are defective sterility may result. McDonald claims that there is primarily a congenital anomaly (hypoplasia of the genitalia) in the etiology of all cases of primary sterility. This however, has not been the experience of the writer who has found that *a preceding salpingitis has been responsible for more cases of sterility than all other causes combined.*

It is commonly admitted that the general health of the woman has much to do with the occurrence of pregnancy. It is also known that men become less potent from the strain of overwork, and that nervous excitability decreases the individual's potency. Women who have become rapidly

obese are not infrequently sterile. Hence it will be seen that each individual case must be analyzed as to its etiology, before any form of treatment can be considered, and *this analysis must include an investigation of both contracting parties*, for in our opinion, the operative treatment of a woman for sterility alone, without the actual inspection of her husband's spermatozoa, is not only unjustifiable but frequently does actual harm to that woman and brings discredity to gynecology. Reynolds in a recent paper presented before the obstetric section of the American Medical Association, offers the following working hypothesis for determining the cause of sterility in the individual case:

1. He states that when the spermatozoa are abundant in number, normal in form and appearance, furnished with long cilia and capable of rapid movement through the semen, the male may be considered as *satisfactorily potent.* While this is essentially true, our experience has taught us that the *presence of infective bacteria in the semen or prostatic discharge*, even if the spermatozoa are well formed, will often vitiate their potency because of the effect produced by these bacteria on the generative organs of the receiving female.

2. When the normal spermatozoa are killed or lose their vitality over rapidly in the secretions of the individual woman, the chemico-physiologic character of her secretions furnishes an effective cause for the sterility.

These alterations in the secretions of the woman which are fatal to the spermatozoa may be located in the vagina, in the cervix, in the body of the uterus, or in one or both tubes. Any of these secretions may exist with normal secretions above it, but alterations in the secreting surface in any of these localities, usually vitiates all the secretions below it owing to the admixture which takes place, for acids in very weak dilution are rapidly fatal to the spermatozoa. *Finally, when the spermatozoa are observed to penetrate without apparent loss of vitality, to the fundus of the uterus*

and to survive there, for a normal length of time, deficient quality of the ova may be considered as the probable cause of the sterility. Lade estimates that there are 227,500,000 spermatozoids in a single ejaculation, and it is stated that the spermatozoa will not live longer than twelve hours in the acid secretion of the vagina, yet in the normal secretion of the uterus and the tubes, they will commonly retain their activity and vitality for six or eight days. In Leopolds case, the woman had not had sexual intercourse for thirty-seven days prior to the abdominal section which he performed, when active living spermatozoa were found in large numbers in the fimbrinated end of the tube. *We have frequently noted during microscopic examination of the withdrawn semen, the effect of the mucopurulent secretion from an infected cervix on the activity and life history of the spermatozoa.* They may be seen struggling around trying to free themselves from the sticky mucus, and finally exhausted from their struggle to push on, die. Hence *we feel that the tight-fitting plug of mucus in endocervicitis is a real obstacle to the advance of the spermatozoid.* Lespinasse claims that the secretions in different women dissolve the spermatozoa of different men and thus produce a sort of immunity action. This is probably the explanation of why certain healthy women fail to conceive by apparently healthy males and then upon remarriage promptly conceive.

Huhner has checked up the progress of the spermatozoid by microscopic examination of the spermatozoa *in situ,* in the genitals of the woman, by taking the woman's secretions at different locations at definite periods after the intercourse, and in this way has determined the action of the secretions and the compartive vitality of the spermatozoa at different locations in the genital tract. This has in his experiments given a direct index of the chemicophysiologic action of the individual secretions and affords valuable evidence as to the possibility of impregnation in a particular case.

While acute anteflexion of the cervix, infracervical hypertrophy and pronounced retroversion of the uterus act as causes of sterility by mechanically removing the cervix from its position in the seminal lake, they will not prevent conception unless there is some change in the chemicophysiological action of the cervicovaginal discharge.

Aside from these factors already referred to, certain clinical observations are worthy of mention, as they contribute materially in determining the value of treatment. The average interval between marriage and the birth of the first child is seventeen months and the probability of impregnation decreases thereafter. Only 25 per cent. of women bear their first child after four years. Therefore, a union may be regarded as presumptively sterile when after three years of married life no child has been born. Hypoplasia of the genitalia is a common cause of sterility. Infantilism may be found in the uterus alone, or in the uterus, vagina, and external genitals, or associated with other evidence of congenital hypoplasia as loose right kidney, justo-minor or funnel pelvis, long back, "cannon-ball" abdomen, intestinal ptosis, small head, weak ligaments, high-roofed mouth, under weight, and unstable nervous system. When the uterus *is infantile*, it retains the shape and appearance of the uterus of the girl before puberty. It may take one of two types. It may be long and slender with a small fundus, a long isthmus and a long conical cervix, or it may be shorter with a long isthmus, small fundus and a small cervix, with most of the cervix placed above the insertion of the vagina and but little projecting into it. The first type has usually a marked anteflexion while the second is frequently associated with marked narrowing of the vagina in its upper part. The infantile uterus usually has a long isthmus with the plicæ palmatæ of the mucosa of the isthmus well marked and longitudinal instead of being thin and horizontal or twisted. The vagina is commonly involved with infantilism

of the uterus. This takes the form of a narrowing, particularly of the upper part of the vagina, thus obliterating the seminal lake, consequently instead of being balloon or pear-shaped with the largest end upward, the vagina is tubular or sausage-shaped. As a result of this the semen is not retained where it should be after coitus, but is expelled from the vagina. Fruitful normal women retain the semen, while sterile women usually lose it. The vulva may also show signs of infantilism, *e. g.*, lack of development of the *labia majora* or *labia minora.*

In managing our cases of sterility, we have begun with a thorough investigation of the life and functions of both contracting parties. In no case included in this report was the examination of the male omitted. These examinations were conducted by Dr. J. S. Read and include investigation as to the past peformances of the man as well as for his present potency; for men who have infective bacteria in their prostatic secretion can produce such inflammatory changes in the femal genitalia as to prevent all hope of future pregnancy.

Unless the man was potent, no attempt was made to improve the woman's condition as regards her sterility, though many women were operated for the cure of complicating lesions. If the man was found potent, the woman was put through a thorough and painstaking routine, beginning with her previous history, including the history of her development, illnesses, nutrition, habits, occupation, rest, and general health. Inquiry was always made into the habits of her sexual life. This was followed by a general examination of the heart, lungs, nervous system, statue, nutrition, whether emaciated or obese, and followed by a pelvic examination to determine the presence of anomalies at the vulva, of the vagina, in the cervix or uterus, or the presence of the results of infection, as shown in Skene's glands, in Bartholin's glands, in the cervix, in the uterus, tubes, ovaries and adjacent peritoneum.

The *reaction of the vaginal and cervical secretions was thoroughly investigated and the presence of gross pathology in the fornices noted. A Wassermann test was made in all of those who presented themselves with histories of abortions or premature labors with or without death of the fetus.* To make this study 798 case records have been reviewed; 231 were found to be inaccurate or incomplete, the patients failing to return for subsequent examination or the husband's record having been omitted, or for some such reason these histories were excluded from our consideration, making a total of 567 from which we can draw our conclusions. From this number, however, there must be some further deductions, such as those cases where the man was impotent, having aspermia, or deformed and sluggish spermatozoa, or where the original infection remained uncured. These cases total up to 64. Furthermore, we have excluded those women who were found to have such gross lesions of the uterus and adnexa as to bar them from even the possibility of pregnancy, and those constitutional conditions as cardiac decompensation and diabetes, which should forbid conception. Of the former there were 70; of the latter 6. Subtracting these cases, we begin with 427 women in whom pregnancy is a possibility. Many of these, however, presented such pathology that we could not say that conception was even probable. For this reason I propose to consider the etiology and the end results of the several forms of treatment instituted in two general classes. In the one we will include infantilism and congenital anomalies, 73; normal pelves, free from circulatory or inflammatory complications, 146; uncomplicated retroversions, 20; and infracervical hypertrophy, 5; making 244 in all. While in the *second class* we will place the remaining 183 cases, all of whom *presented some evidence of the results of an infective process at one or more locations along the genital tract.* It is intensely interesting to note the frequency with which infection has invaded these several sus-

ceptible points. Our records show that the glands at the introitus were infected 43 times, while 104 cases presented an endocervicitis with a mucopurulent discharge. These were complicated with a posterior parametritis in 78 instances. Fibroid tumors of varying size, and of the subperitoneal type, producing no symptoms and only discovered in the course of the examination, were recorded in 54 cases. Ovarian cysts varying in size from that of an orange to that of a seven months' pregnancy, was the apparent cause of sterility in 10 instances. The results of infective processes in the tubes were found in 96 cases. These were almost always associated with inflammatory or cystic changes in the ovary. In 11 cases the tubal infection had extended to the pelvic peritoneum and the patient, though presenting no gross lesion which was palpable at the examination, was the subject of recurrent attacks of pelvic peritonitis. In each of these cases a double hydrosalpinx was the resulting lesion. Retrodisplacement of the uterus complicated by tubal or ovarian disease was noted in 61 women. Prolapsed ovaries, palpable and tender, often producing severe dyspareunia, were relatively frequent, as we find that they were noted as a complicating lesion in 92 histories. Only 3 patients with acute vaginal inflammation presented themselves. In 2 of these the Neisser bacillus was isolated. The other showed numberless diplococci that would not stain Gram negative.

In the first class which includes all the cases of infantilism, mention should be made of the frequent association of bony pelvic anomaly. Funnel pelvis, male pelvis and justo-minor contraction was noted with such frequency, that we feel that the subject should have more consideration than has been given it by the gynecologist in the past, for it seems questionable when a woman has a definite bony pelvic deformity, whether we are right in employing operative measures for the cure of her sterility when we know she will

have a difficult operative labor. Certainly, the patient or her husband has a right to the knowledge of these facts. In the 73 cases recorded as having an infantile uterus, bony pelvic anomaly was recorded 41 times. This was shown in the short external measurements, the depth of the symphysis pubis, a narrow subpubic arch, the short bi-ischial diameter or faulty inclination of the pelvic brim.

Treatment. Our treatment, as may be supposed from a glance at the foregoing statements, was in all cases directed toward the correction of the existing causative lesion. In the first class, this included the employment of alkaline douches, of the graduated dialators, the Baldwin or Davenport stem, discision of the cervix, after the methods of Dudley or Pozzi, amputation of the cervix and correction of uterine displacements.

In the second class both local and operative measures were employed. In those cases of uncomplicated cervicitis and endocervicitis where the tenacious mucus plug presented the obstructing lesion, the mucus was removed with peroxide of hydrogen paste on a rotary applicator, the mucosa sterilized and an iodized phenol solution applied. The patient directed to follow this application with douches in the recumbent position before retiring, using a solution of bicarbonate of soda, a tablespoonful of the soda to a quart of water. Vaccines and destruction of the cysts with the electric cautery knife have also been employed, but our best results have been obtained from simple antiseptic measures. Women who have repeatedly aborted, in whom the Wassermann test was reported negative, were curetted and the cavity of the uterus thoroughly iodized by packing the uterus with strip gauze soaked in iodine. *This was left in place for twenty minutes* and was then removed. These patients were then advised not to cohabit for a period of three months. In the meantime, special attention was given to improving the condition of their general health, by exercise, tonics and

fresh air. Those presenting large fibroids not involving the uterine cavity, had the tumor removed by myomectomy. Small tumors received no surgical consideration. *In the* 10 *cases of large ovarian cyst, unilateral oöphorectomy resulted in* 8 *of the women becoming pregnant.* From this observation it would seem that a large cyst of one ovary militated against the proper functionating of the other ovary, until that cyst was removed. Infective processes in the tubes were dealt with by unilateral ablation, bilateral ablation with resection of the uterine ends or of the fundal segment of the uterus, or by salpingostomy. It was frequently found that the inflammatory process had passed through the tube, and time had allowed considerable resorption, and that it was the resulting adhesions which had closed the abdominal ostium and embarrassed the ovarian function. Freeing these and suspending the ovary has occasionally resulted in pregnancy. In the series of retroversions complicated by tubal and ovarian disease, all the women were subjected to abdominal exploration and investigation. In these the tubes were freed from adhesions, ablated or resected, the ovaries suspended after the method suggested by my associate, Dr. William P. Pool, and the round ligament shortened by one of the methods following the technics suggested by Webster, Gilliam, Simpson, Coffey or Neel.

Of the cases of prolapsed ovary we have found that *an ovary out of place has its tunic thickened* from circulatory stasis, so we have been in the habit of suspending such ovaries after puncture of the superficial cysts, to reduce their weight and have thus established a better ovarian circulation. *No resections have been done except in* 6 *cases of large white ovary,* in obese women with amenorrhea, where the tunic was extensively thickened. In these cases a large wedged-shaped piece of cortex was removed and the area of excision closed with fine catgut sutures. This has reëstablished menstruation in all 6 cases and resulted in a pregnancy in 3.

In the 73 cases of *congenital anomalies*, which include extreme anteflexion of the cervix, with deep posterior invagination, anteflexion of the body and cervix, and infantile uterus, the following corrective operations were done. In the anteflexions of the cervix in which the invagination of the posterior lip was 5 cm. or more in length, a posterior decision after Dudley's technic was always elected in order that the cervical os, so constructed, could be placed in the seminal lake. In the anteflexions of the body alone we have elected the use of the Reynolds procedure combined with the use of the intra-uterine stem (Baldwin). In anteflexions of the body and cervix our procedure has always been dependent upon the amount of cervical invagination. If this was considerable, a posterior discission in conjunction with the Reynolds anterior colpoplasty will straighten the canal. On the other hand, when the portio was short, gradual dilation, anterior colpoplasty and the introduction of a glass stem will often produce the desired relief.

In the true infantile uterus it is questionable whether much should be done. Our only pregnancy results in this type have been two *ectopics* and five miscarriages, for not only is the anomaly in the uterus, but in tubes, ovaries, and vagina, and the dysmenorrhea which is prominent, is only temporarily relieved by operation. In this class we doubt if any plastic procedure is of much avail, as we have found that the presence of scars in a small vagina, embarrasses sexual relations. *Slow dilation* with Hegar's sounds, up to 16 to 20 mm., and the introduction of a Davenport stem, has afforded some relief, but no infantile uterus in this series has developed a pregnancy and gone to term. Seven have conceived, the two ectopics referred to above, and in five the impregnated ovule has reached the uterus and developed there, only to end in an abortion at the second or third period.

Included also in our first general classification are 146 normal pelves, free from circulatory or inflammatory changes

of any sort. These women had been married for periods of three years or more and had never been pregnant before applying to us for relief. The husband was potent, The reaction of the secretion of the vaginal vault was determined in each case; 109 showed varying degrees of acidity. Examination of the semen *in situ* in *these cases showed* many immobile spermatozoa. *In all who gave an acid reaction* alkalin douches of soda bicarbonate and sodii phosphate, 1 ounce to the quart, were advised to be taken on a douche pan, after retiring. Pregnancy resulted in 75 or about 70 per cent. making this our most successful series; 37 showed no change in secretion, yet only 4 have become pregnant as the result of local treatment. No operative procedure of any sort was done in this apparently normal pelvis class. This rather goes to confirm the theory that certain women are immune to impregnation by certain men.

Of the 20 uncomplicated retroversions, 11 were repositable and could be maintained in position with a pessary; 6 of these women became pregnant; 9 because of a deep posterior invagination of the cervix, could not be held in place with a support. These were operated by the Webster-Baldy or Gilliam technic and a Dudley discission. Of these 5 have become pregnant. This shows conclusively to my mind that the position of a cervix in its relation to the seminal lake has much to do with conception, provided the secretions are not destructive to the life of the spermatozoön.

Infravaginal hypertrophy of the portion has given us not only the best surgical cures, but amputation of the hypertrophied portion of the cervix has been followed by pregnancy, going to full term, in each of our cases 5 in all.

In the second class made up of 183 women presenting some evidence of the results of an infective process, postpartal, postabortal, or gonococcic in origin, pregnancy has been relatively infrequent. Of the 104 women subjects of endo-

cervicitis with a mucopurulent discharge, only 21 became pregnant; 8 conceived as a result of one local treatment in which the mucous plug was removed with a bicarbonate paste, and the canal swabbed with iodized phenol; 3 became pregnant promptly after the glands were destroyed with the cautery, and 10 following the persistent use of the carbonate of soda douche.

Of the 90 cases which were found to have the results of infective processes in the tubes, uterosacral ligaments, and cervical canal, the intra-uterine and tubal pregnancies are equally divided, there being 3 of each. The abdomen was opened in all of these patients because of the history, not because of the gross pelvic findings. There was invariably present a history of infection, with sterility, dyspareunia, and local discharge. Tubal ablations were done 35 times, resections 31, and freeing of adhesions thirty times; 2 ectopics occurred in resected tubes, against 3 intra-uterine pregnancies; 1 ectopic occurred in a freed tube, but no uterine pregnancy. Of the 54 fibroids, myomectomy was done in 20 and hysterectomy in 34; 6 pregnancies occurred following myomectomy, 4 going to term. Following the 10 unilateral oöphorectomies for large ovarian cysts, 8 women became pregnant.

132 uterine and 3 ectopics are the sum total of pregnancies occurring in 358 women in whom conception was a probability, or 37 per cent.

This study has shown us *first*, that a very large number of the sterility cases applying for relief, have no chance whatever of becoming pregnant, as the pathology is such as to make conception impossible. *Second*, that the male is largely responsible for our poor results in treatment. *Third*, that there is a definite chemico-physiologic factor in conception, at present unexplainable, which is a cause of preventing conception. *Fourth*, that operative procedures on the uterus, except amputation of the hypertrophied portio, have but

a slight influence on the end results in the treatment of sterility: and *finally*, that each case must be individualized and both contracting parties carefully studied before any treatment is inaugurated.

DISCUSSION

Dr. Robert L. Dickinson.—Mr. President, as one of the members of the Council I regret that this paper escaped being a referat because it would have turned an important contribution loose upon this Society for six months' preliminary study for a report from many members. Thus stimulated we would have brought together most valuable material. Perhaps we can still make this good, and three years from now it may become the subject of a referat. If the meeting takes place in Washington we can readily bring in genito-urinary men and others interested in all phases of sterility.

Since intensive study has been initiated on the part of some of the members of my staff I believe that if we should confine our gynecological work to the treatment of sterility alone we should be kept busy. There is a clamor for more knowledge from the public and it behooves us to take it up. We should start such study, not as we do, from the wrong end, but from the right end. Dr. Polak has shown us once more that salpingitis is the great cause of sterility, so let us begin at right in two ways—first, join the campaign to prevent salpingitis and educate the public; and second, study physiology.

As an example, take the physiology of conception. Little has been written on some important phases of the subject. I started Dr. Cary on getting together the literature concerning the semen and in a month, at odd times, he gathered together all there had been written. In another month or two of clinical study he was an authority on the subject. Now he is often summoned to give lantern slide demonstrations on these studies. And yet this is mere A B C. But it is an example of the need of this work.

As a further example, nobody knows anything about catheteri-

zation of the inner end of the tube, or much about how the kinks of hydrosalpinx and pyosalpinx close the bristle-sized opening of the inner end of the tube. In other words, here is a big field for study. Nobody knows the exact behavior of the semen in the vagina. There is no method of determining degrees of vaginal acidity and their effect on the semen, and on different semens. Stuff the introitus with a condom covered tampon after coitus and study the behavior of the semen one to three or four hours later, and you will see that the behavior of semen in the vagina is different from that on the warm stage. I am touching merely on the high spots. Hühner wrote a book with an important false concept. He would suck mucus from without the body of the uterus after coitus, at varying lengths of time. If the tails of the spermatozoa were curled up they were dead; if their tails were straight they were alive. If you take any semen and suck it roughly into any narrow tipped pipette the spermatozoa curl up.

The study has only been scratched on the outside. Little is known about the life history of semen. The vaginal secretions must be put against the semen on the special slides that let the two gradually fuse in view, and see what happens. And so with a lot of chemical tests, combined with semen. The usual examinations of the semen are nearly worthless.

Let us then consider taking up the whole subject three years from now.

Dr. Charles P. Noble.—The first point I wish to stress is the large percentage of gonorrhea in these cases of sterility. I think Brooklyn, judging from my experience, has a larger percentage of gonorrhea than Philadelphia.

So far as syphilis is concerned, when I was a medical student in Baltimore, one Professor, a man of the widest clinical experience used to teach us that one-third of the inhabitants of Baltimore had syphilis. I happened to meet, recently, one of my old quiz teachers, who is an ophthalmologist, and I asked him, after reminding him of this old statement, what his judgment was as to the present status of syphilis in Baltimore; and he said it was far more prevalent than it was thirty years ago.

The point, however, I wish to discuss is the one touched on by Dr. Polak under the term infantilism. The doctor did not go into particulars about infantilism, nor did he show how much attention he had paid to the subject. If the question of infan-

tilism is studied biologically we find it is a far more prevalent condition than is recognized from the ordinary medical standpoint. In other words, men who are not trained to investigate individuals from a biological standpoint only note the more extreme cases, and therefore the percentage which Dr. Polak found in his series, I am sure, is an understatement of the facts.

I am very much pleased that one of our Council has proposed the subject of sterility for a referat three years from now. The way we should study this question is from the standpoint of the teratologist. What is called infantilism is in no small part caused prior to conception in the dual life of the human being as an ovum or as a spermatoblast in the testis, or the ovary. In other words, the toxins circulating in the bodies of human beings will influence the chromatin in the ova and in the spermatoblasts, unfavorably.

Quite recently Dr. Stockard, who has given much attention to this subject, has succeeded in absolutely demonstrating that this is true; and not only is it true, so far as the progeny of the first generation studied is concerned, but it is also true of the great-grandchildren. This past year he published the final results of his study on alcoholism in guinea-pigs. Of course, these guinea-pigs were far more intoxicated than even the worst chronic drunkard in the human ever gets. They were made drunk six days a week during their lifetime, and were then cross-bred, the drunken male and healthy female, and the healthy male and drunken female, and vice versa. The whole series of degenerate phenomena has been demonstrated in the great-grandchildren—although the subsequent generations were free from alcohol.

The point I wish to emphasize just now is that where the succeeding generations have not been alcoholized the great-grandchildren are far more affected than are the children, showing the effect is permanent, and related to heredity; when once the chromatin is affected. This has to do with the influence of disease upon progeny, prior to pregnancy. All during pregnancy the toxins in the mother can likewise poison the growing ovum, and can bring about what is sometimes called infantilism. It does not make any difference what name we give it. The offspring may be or may not be injured prior to conception, or during intra-uterine life. The term congenital

we will also have to revise. In fact, we will have to stop using it because it is true that growth in people can become arrested after they are born, and all of us who have been clinicians long enough to have accumulated clinical experience know that whenever the growing child gets sick it stops growing. If these children suffer serious illnesses, long continued, prior to puberty, growth is arrested, and this may include the sexual organs. All these factors underlie the problem of so-called infantilism. The truth is we use all these words loosely and use them from habit. I doubt very much whether any woman, except in rare anomalies, has an infantile uterus. What they have is an adolescent uterus.

Dr. Walter P. Manton.—As an obstetrician, I have listened to this paper of Dr. Polak's with a great deal of interest, and I had in mind to make the same criticism as Dr. Noble has made with regard to the findings in the male: After a considerable number of examinations of the spermatic fluid I have rarely found the male at fault. Of course, sterility may be relative or absolute, and I believe it is very largely relative excepting in malformations of the genital organs or following gonorrhea. Roughly speaking, I cannot make an accurate statement, I have found that practically 85 per cent. of women, who come to me with sterility, where there is no deformity of the local organs and no evidence of gonorrhea, are cured by local treatment. I say this condition is relative because I find that a very large proportion of women become pregnant after a little and simple treatment. In some there is sexual antagonism! There may be sufficient affection between the husband and wife, but there is this antagonism between them sexually to which Dr. Polak has referred. A woman may have been married a number of years and not become pregnant; she marries another man and immediately pregnancy ensues. We have also a good many cases of one child sterility, and I find that usually there is some slight local condition at fault in most of the cases.

I recall a woman of this class who had been married for a number of years and had one child ten years previously. The husband had a watering pot perineum where the spermatic fluid was discharged through the openings, yet this woman became pregnant within two years after treatment.

We expect too much from treatment; that pregnancy should

immediately follow any treatment is not to be supposed. If the patient should not become pregnant within two years following a treatment, I think the effect of what has been given is *nil*.

Dr. Charles G. Child, Jr.—The work of H. Unna has been mentioned twice, once with praise and once in condemnation. Of course, nobody knows it all, but I believe H. Unna's work is a particularly valuable one.

The fertility of the male is something which concerns us in our work more vitally than Dr. Manton has laid stress on, because in the cases that have come under my observation the gonococcus is responsible for nearly one-half of all unfruitful marriages. The method of determination of the fertility of the male was by the inspection of condom specimens of vagina pools, as H. Unna aptly shows, this is insufficient. We must trace the spermatozoa farther, find out whether they reach the cervical canal, how long they live there, and whether they gain access to the uterine cavity. H. Unna did not say that if you examine these spermatozoa and find them with crooked tails they were alive, and if they had straight tails they were dead or *vice versa*. He recognized that the immature spermatozoön were the ones with the crooked tail; that if the tail was straight that spermatozoön had lived. The passage of the ovum may take place through a very small opening in the Fallopian tube. I do not think Dr. Polak is fair to his statistics because in a small percentage of cases of probable pregnancy he says the pathology at times is such as to make conception impossible. It is my experience that the pathology at times is such as simply to make one marvel at the results which Nature accomplishes in these cases. Numerous women, with only a uterus and ovaries, but no tubes, have conceived so that I think Dr. Polak is too pessimistic in regard to the pathology which he may encounter at operating.

I have had in the past one woman who conceived after both tubes were removed. Murphy removed the left tube in Chicago and I removed the right one in New York. Murphy did his work well. The pregnancy was interrupted, for toxemia and the uterus was subsequently removed. The pathologist, after an exhaustive search was unable to find any opening from the outside of the uterus to the cavity yet the woman had conceived. Cases where conception has occurred following the

removal of both tubes is quite frequent. In one case where I produced artificial sterility on account of cardiac decompensation the woman conceived within two years. I had again to empty the uterus by the abdominal route and inspected the condition of the tubes. The tubes were absolutely occluded at the time of operation by burying the fimbriated ends between the folds of the broad ligament. There was a small opening by the side of the left tube which barely admitted a filiform bougie. One of the sutures which had been too tight, had left a little sinus not larger than the finest filiform bougie, yet the ovum had worked through this tiny opening and the woman became pregnant again within two years.

With regard to the removal of the mucous plug in the cervix, I have had more success in removing this plug by a Bier's cup and suction which removes the mucous plug without traumatizing or causing bleeding of the cervix; three or four treatments produce a marked diminution in the amount of discharge. It is a most successful way of treating chronic cervicitis and of doing away with the formation of this mucous plug.

Dr. Richard R. Smith.—Dr. Polak and Dr. Dickinson have not exaggerated the importance of this subject, and I only want to speak of one phase of it that has not been touched upon.

Out of Dr. Polak's large group of cases of sterility he was able to relieve a remarkable number of women. There still remains a very large number that, with all of his care and treatment, he was unable to help. What shall we do for such women? Shall we go on attempting to cure their sterility, allow them to drift about from doctor to doctor, fostering the hope that they may become pregnant? Or shall we face the problem fairly and squarely, admit the improbability of their ever becoming pregnant, and advise them differently? It seems to me that this has not always been sufficiently considered. We are constantly seeing women made year after year unhappy because of their sterility, and for whom we really are doing nothing. The maternal instinct is strong in the minds of the majority of women, and its gratification necessary to contentment. To be sure, women are best satisfied with the children they have borne themselves, but it is also true that those they adopt go a long ways toward satisfying the maternal instinct, and after the adoption of children these women become surprisingly content. They are often much bettered nervously.

The adoption of children, it seems to me, is what we should advise in these cases when there does not seem to be a reasonable certainty of their becoming pregnant. This if possible should be done early. They should not be allowed to drift on until they are thirty-five or forty years of age, to a time when they are no longer so active and capable of taking care of young children. I have adopted this plan of advice for a number of years, and it has been to me the most satisfactory thing that I have found for the treatment of sterility that could not be relieved within a reasonable length of time.

Dr. John Osborn Polak (closing).—I appreciate very much the cordial reception which my effort has received.

Referring to Dr. Noble's criticism, I am sure that if all of our cases had been as carefully examined as those during the past three years, it is possible that the number of cases of infantilism would be increased. Seventy-three out of 437 is however a fair proportion, though not so large as Dr. Noble thinks should be found. The total percentage of cures in this series only amounts to a little less than 37 per cent.

I wish to call the attention of Dr. Child and Dr. Manton to the fact that in this 37 per cent. we had 146 pelves, free from inflammatory or circulatory changes of any sort. These women had been married for periods of three years or more before they came for treatment. The reaction of the secretion of the vaginal vault in each case was determined, and 109 showed varying degrees of acidity. Examination of the semen in situ in these cases showed many immobile spermatozoa. In all whose secretions gave acid reactions alkaline douches were given, and from this simple treatment there were from 70 to 75 per cent. of pregnancies, which makes the largest percentage of cures next to the five cases of amputation of the cervix. In the next series 37 showed no change in the secretion, yet only four have become pregnant as the result of local treatment. No operative procedure of any sort was done in these cases of normal pelves, and our results seem to confirm the theory that certain women are immune to impregnation by certain men. It is this point we are up against and will have to work out more fully than any of us have done at the present time.

In regard to the other point made by Dr. Child and Dr. Manton, I will say that Brooklyn is known as the city of churches, and we have, as you can readily realize, a better class

of men after they get married and settle in Brooklyn, but they come from New York and marry Brooklyn girls. (Laughter). The result of this is that they bring the products of their infection with them, and it is this prostatic pus which under a certain stimulus develops or brings out the latent gonococcus that causes the inflammatory changes which we find along the genital tract of the female, and which has so much to do with the prevention of impregnation.

In regard to Salpingostomy as a curative measure, brought into the discussion by Dr. Child, I wish to say I am not a pessimist as I appreciate the penetrability of the spermatazoa, and I have reported three cases of pregnancy before the American Medical Association some years ago, where both tubes had been removed and where the uterine ostium had been excised. I look at these as accidents and curiosities.

In regard to one child sterility, we have not included this phase of the subject in this paper because personally I find that one child sterility is in most cases due to a mixed infection. There is always a history of infection, and if we open the abdomen in these cases of one child sterility, we find definite pathological changes as a result of a low type, late infection following labor or miscarriage. It is a mixed infection in which the streptococcus or staphylococcus and gonococcus take part, the latter predominating. Even where a Neisser infection is denied we have found a diplococcus which may develop in certain instances into definite activity. We find a large number of these diplococci in locations where they should not be. They do not stain Gram negative, and yet I believe they bear some relation to some of these cases of sterility.

RUPTURE OF THE SCAR OF THE PREVIOUS CESAREAN SECTION

By Palmer Findley, M.D.
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A young woman was admitted to the Charité Frauenklinik of Berlin in June, 1915. Two years before she had been Cesareanized at term for a rachitic pelvis. She was in the seventh month of gestation, and was bleeding moderately from a marginal placenta previa. The assistant in charge of the Kreisszimmer was of the opinion that a second Cesarean section should be performed, and accordingly the case was submitted to Prof. Franz, who commented upon the wide abdominal scar, but gave no consideration to the possible existence of a defective uterine scar. He counciled against Cesarean section, and gave orders to insert a hydrostatic bag, and after dilatation of the cervix to perforate the head and extract the fetus. These instructions were carried out, and with the second uterine contraction the patient went into collapse. The fetus was distinctly recognized to be free in the abdominal cavity.

The patient was rushed to the operating room and within thirty minutes the uterus was removed together with the escaped fetus and blood. Death followed within two hours from shock.

A study of the removed specimen revealed a rent directly through a median scar low on the anterior surface of the

uterus and largely within the thinned lower uterine segment. It was evident that the uterine scar, as well as the abdominal scar, had become infected following the initial Cesarean section. There was but a thin fibromuscular bridge between the serosa and atrophied mucosa.

In commenting upon the case before the clinic, Prof. Franz said that in the future he would make his incisions high on the uterine body where the muscular development is the greatest, and would advise Cesarean section upon every pregnant women who bears the scar of a previous section.

A few weeks later I saw Prof. Jardine in the Glasgow Maternity perform a Cesarean section before the onset of labor, because of the existence of a very thin uterine scar. At the same clinic two uteri with ruptured scars were exhibited by Prof. Samuel Cameron.

These observations enlivened my interest in the question of rupture of the Cesarean scar, and has led to a review of the literature for the purpose of determining whether or not one Cesarean section calls for another in event of a subsequent pregnancy. I confess at the onset to have entertained a prejudice in favor of repeated Cesarean section in all cases to forestall a possible rupture, but as the work developed in my library I was led to conclude that such a position is untenable.

In earlier years, when indifferent asepsis and haphazard suturing were practised, we are informed by Krukenberg, in his classical work, that fully half the scars are ruptured in subsequent labors. This is in marked contrast to the brilliant results following the adoption of the improved method of suturing proposed by Sänger in 1882. From 1882 to 1895 Sänger collected reports of 500 cases without a single rupture. From 1895 to 1900 three cases of rupture were recorded and from 1900 to 1911 there were 40 cases

of rupture and 8 of serious dehiscence of the scar recorded. Wyss observes that this increase in the number of ruptures is not chargeable to the growing popularity of Cesarean section, but is perhaps due to departure from the tried and proved method of suture of Sänger. While it is true that the exact technic of Sänger is not followed in late years, yet the essential principles of the method of suture are generally observed, and it is fair to assume that marked deviations from the principles laid down by Sänger have largely accounted for the increase in the number of ruptures. These principles are tier suturing, sutures which pass through the entire thickness of the uterine masculature and placed close together, infolding of the serosa to prevent the formation of adhesions, exclusion of the decidua in the sutures to prevent the interposition of the decidua between the severed muscle fibers, and finally the tying of all sutures tightly to allow of subsequent relaxations and contractions of the uterus without the formation of gaps in the uterine wound. If the above conditions are maintained, and the wound remains aseptic, there is every reasonable assurance that there will be firm muscular union with little development of scar tissue. Such wound healing should favorably insure against rupture in event of a subsequent pregnancy.

The character of the suture material, so long as it is sterile, does not seem to enter into consideration. As expressed by Olshausen and Bumm a proper wound healing depends less upon the suture material than upon the method of suturing. In former years poor quality of catgut would give way and still earlier fine silver wire was known to cut through.

Doubtless the greatest factor in the production of insecure wound healing is septic infection. In this connection we are reminded that too often conservative Cesarean sections are performed in the presence of sepsis when sterilization

or Porro operation would have been the wiser choice. Furthermore, we have to reckon with latent gonorrheal infections (Wyss) and with retained lochia (Jolly) as sources of infection. *This brings us to the admission that there is no positive assurance of obtaining a perfect wound healing whatever the method of suturing or whoever the surgeon. The uterine scar is an unknown factor in all cases.*

The transverse fundal incision, introduced by Fritsch in 1897, has apparently had more than its share of failures in respect to firm healing of the uterine wound. Vogt reported six ruptures in fundal scars. Couvelaire, in his report of 50 cases of rupture of the scar, finds 17 of this number were through fundal scars. In 1910 Dahlmann reported 26 cases of rupture through fundal scars. In view of these reports, and considering the relative infrequency of the Fritsch operation as compared with the classical operation of Sänger, we are led to agree with Everke that transverse fundal incisions are relatively insecure. Wyss says the introduction of the transverse fundal incision has not lessened the danger of rupture, and Scheffzek remarked that the unusual tissue distortion, especially in the fundus in puerperal involution, makes firm union of the scar problematical.

As to the integrity of the scar in extraperitoneal and cervical Cesarean sections, experiences and opinions differ widely. Judgment must be withheld until a larger number of repeated pregnancies following these procedures are on record. Frank reported 8, Sellheim 5, Litschkuss 12, Alow 30, and Rohrbach 93 cases of cervical Cesarean section which have stood the test of labor without rupture, and Vogt concludes that rupture of the scar in the cervix is of rare occurrence.

On the other hand, Routh says cervical and extraperitoneal Cesarean sections are not in favor in England. Traugott,

Bumm, Gobbardt, Sellheim, and Wolf report marked thinning of cervical scars with impending rupture, and Wyss assumes a skeptical attitude on the dependability of these scars, and expresses the opinion that a bad cervical scar is more dangerous than a fundal scar because of the marked thinning of the lower uterine segment in labor. Chiaji finds thinning of extraperitoneal scars has occurred in 17 per cent. of cases, and concludes that no security is afforded in subsequent pregnancies. Finally, we have the word of Leopold that classical Cesarean section, with its good results for mother and child, remains the most efficient operation, and which alternative procedures will never supplant or restrict.

Numerous authors have described the manner of healing of the uterine wound. A fibrinous deposit forms on the cut surfaces, and beneath this are newly formed connective-tissue cells. If the wound is kept in perfect coaptation, and free of infection, muscular regeneration will effect a complete muscular union, making the scar invisible to the naked eye and scarcely discernable under the microscope. Perfect coaptation may be prevented by infection, by the giving way of sutures and by the alternating contractions and relaxations of the uterus in the presence of loosely tied sutures. Not infrequently the wound opens up at one or more points in the scar. With the separation of the cut surfaces small hematomata are formed and later are replaced by connective tissue with little or no muscle fiber. Such a scar presents a *locus minoris resistencia*, but it is remarkable to note that they are so often capable of resisting the forces of labor. Couvelaire says 75 per cent. of these defective scars will stand the test of labor without rupture. Utero-abdominal fistulæ have developed in a number of instances as a result of insecure knots and in the same manner dehiscence of the entire uterine wound has occurred. Where silk has been used, fistulæ may make their appearance

several months after Cesarean section and may persist indefinitely. The ovum has been known to attach itself to such fistulæ and form a hernial protrusion of placenta and membranes. In these weakened scars a fibromuscular bridge separates the serosa from mucosa. Occasionally there is an entire absence of muscle fiber. The connective tissue may be scant, leaving little more than the serosa and atrophied mucosa to withstand the forces of labor. When catgut is used the sutures will usually be absorbed in thirty to sixty days. Studdiford found chromic sutures practically unabsorbed six and a half years after their insertion. In a number of instances silk sutures have been known to disappear.

Mason and Williams made a series of experiments on pregnant cats and guinea-pigs to determine the relative strengths of scar and normal uterine wall. Weights were suspended from sections of the uterine wall containing linear scars, and it was found that rupture invariably occurred in the muscle and not in the scar, thereby confirming the clinical observations of Schauta, who says that with modern closure of the wound rupture will more likely occur outside the scar. In a number of instances the rupture was observed to start in the scar and to extend through the musculature at the side of the scar.

In 50 multiple Cesarean sections performed in the New York Lying-in Hospital, Harrar finds no visible scar or no thinning in 42, thin scars in 4, partial rupture in 2, and complete rupture in 2.

That placental implantation in the scar predisposes to rupture is the opinion of Dahlmann, Vogt, Couvelaire, Schick, Blind, Wyss, Ekstein, Fischer, and Werth. Vogt found the placental insertion in the scar in 9 of 22 recorded cases, Couvelaire in 8 of 9 cases, Dahlmann in 8 of 15 cases. Werth and Ekstein likened the influence of the placenta

upon the underlying scar to the trophoblastic function of the placenta in ruptured tubal pregnancy. Decidua and chorionic structures have been observed to penetrate the fibromuscular bridge to the serosa. Fischer, in referring to the relative frequency of rupture in transverse fundal incisions, expresses the opinion that the probable explanation lay in the frequency of placental implantation at the fundus.

Few authors advocate sterilization following Cesarean section unless by the urgent request of the husband and wife. Numerous authors have reported their second, third, fourth, and even fifth Cesarean section on the same individual, and Charles did his sixth Cesarean on the same woman. This may be taken as an expression of confidence in the integrity of the scar. Notable exceptions to this viewpoint are Jardine, Opitz, and Govrich, who advocate sterilization after the second Cesarean section.

John T. Williams, in writing on, "Delivery by the Natural Passages following Cesarean Section," takes issue with Breitstein, Couvelaire, Marioton and others who are committed to the rule of "once a Cesarean section, always a Cesarean section." He says: "When a uterus has been sutured with care and there has been no subsequent infection the Cesarean scar will be strong enough to withstand the distention of a full-term pregnancy and even the strain of a full-term labor." He bases his conclusions upon the records of 32 cases reported by Van Leuwen with additional cases of his own. In none of these cases did the scar rupture during pregnancy or in the delivery through the natural passages.

Among the safeguards against rupture through the scar of a Cesarean section is the relative sterility of these cases. It is estimated that less than half of them again become pregnant. Furthermore, it is noted that a long interval

between the section and subsequent pregnancy adds to the security of the scar. Asa B. Davis tells us that he believes rupture of the scar could have been prevented in all of his cases had a timely Cesarean operation been possible. Second, only in importance to timely intervention by repeated Cesarean section, when there is reason to believe that the uterine scar is defective, or where obstruction exists to the passage of the fetus, is the avoidance, as far as possible, of all intra-uterine manipulations such as versions, the application of forceps, the introduction of hydrostatic bags, tampons and pituitrin.

Inasmuch as the great majority of all cases (75 per cent.) that have ruptured ran a fever course following the Cesarean section, I would formulate the rule that all such cases call for serious consideration in event of a subsequent pregnancy.

Repeated Cesarean sections are said by many to give better results than primary Cesarean section, because of the frequent presence of adhesions which wall off the general peritoneal cavity and make it possible to deliver the baby without entering the free abdominal cavity. Such a case I recently witnessed in Polak's clinic at the Long Island Hospital of Brooklyn. Broadhead and Sinclair suggest ventrofixation of the uterus by suturing the uterus outside the margins of the wound to the parietal peritoneum. In 30 cases reported by Sinclair, pregnancy was terminated without untoward symptoms. But, as Wyss observed, ventrofixation has been followed by rupture, and it remains for the future to determine the merits of the operation. Certainly it is not in line with recognized surgical procedure. We can scarcely hope to have the good fortune of Bar, who has seen no disturbance to mother or fetus from adhesions.

The following data are deduced from the foregoing tables of case reports:

AGE

In 37 cases, where ages are given, rupture occurred in 21 between the ages of twenty to thirty and 14 between thirty to forty.

NUMBER OF CESAREAN SECTIONS PERFORMED PRIOR TO RUPTURE

55 cases had 1 C. S.
6 cases had 2 C. S.
2 cases had 3 C. S.

INDICATIONS FOR C. S. PRIOR TO RUPTURE

In a total of 49 cases there were:
32 for contracted pelvis
1 for lumbokyphosis
1 for sarcoma of sacrum
1 for vaginal varices
10 for eclampsia
1 for transverse position with tetany uteri
1 for transverse position with contracted pelvis
1 for nephritis.

PARA

Ruptures occurred in:
2d pregnancy in 23
3d pregnancy in 11
4th pregnancy in 3
5th pregnancy in 4
6th pregnancy in 2
8th pregnancy in 1

TIME OF RUPTURE

Time of rupture was mentioned in the reports of 52 cases:

In 41 cases at full term.
In 6 cases at seventh month.
In 2 cases at eighth month.
In 3 cases at eight and one-half months.
In 1 case at eleventh lunar month.

INTERVAL BETWEEN C. S. AND RUPTURE

9 between 1 and 2 years.
22 between 2 and 3 years.
6 between 3 and 4 years.
4 between 5 and 6 years.
1 in 8 years.
1 in 12 years.

LOCATION OF C. S. INCISION

In 53 cases:

33 were median
20 were transverse fundal

METHOD OF SUTURE IN C. S.

In 36 cases there were:

Tier sutures in 29 (22 of catgut alone, 3 of both catgut and silk, 4 of silk alone).
Typical Sänger suture in 1.
Peritoneum alone sutured with silk in 1.
"Exact" suturing with reindeer tendon in 1.
Silk used but manner of suture not recorded in 1.
Catgut used but manner of suture not recorded in 1.

PLACENTAL SITE IN C. S.

Mentioned in 10 cases.
Incision made over placenta in 8.
Placenta on anterior wall in 2 at side of incision.

PLACENTAL SITE IN RUPTURE

Mentioned in 20 cases.
In or near the tear in 18 cases.
Not in tear in 2 cases.

TREATMENT OF RUPTURE

Suture of wound in 15.
Porro in 19.
Vaginal hysterectomy in 3.
Total abdominal hysterectomy in 2.
Supravaginal hysterectomy in 11.
Laparotomy and drainage in 1.
Rupture found at autopsy in 2.
Unmentioned in 4.

RESULTS TO MOTHER

Mentioned in 59 cases.
41 recovered.
16 died.
2 died on tenth and seventeenth days (cerebral embolism, pneumonia).

RESULTS TO CHILD

47 mentioned.
34 died.
13 lived.

GENERAL REMARKS

Fever followed C. S. in 24 cases.

Decidua mentioned as invading scar in 10 cases.

Syncytium mentioned as invading scar in 2 cases.

Scar mentioned as very thin in 17 cases.

Scar with complete muscular regeneration in 4 cases.

In only one case did normal labor intervene between C. S. and rupture.

Utero-abdominal fistulæ developed in scar of C. S. in 4 cases.

Tubal sterilization done in 2 cases following suture of rupture.

Rupture mentioned as following induction of labor by bag or bougie and by version and extraction in 5 cases.

In one case pregnancy and rupture followed ligation of tubes at time of C. S.

In one case rupture occurred while patient was being prepared for Cesarean section.

Conclusions. 1. A perfectly healed Cesarean wound may be relied upon to resist the forces of labor, but in view of the fact that the integrity of the wound is an unknown factor in all cases we are constrained to exercise the utmost caution in the conduct of every case in pregnancy and labor following Cesarean section.

2. Failure to secure perfect healing is accounted for by departure from the principles of suture proposed by Sänger and by septic infection of the uterine wound. If we are to obtain the uniformly good results in respect to wound healing that were obtained in the decade following the introduction of the Sänger method of suture, we must not deviate from these principles.

3. The possible existence of latent gonorrheal infection may defeat the most painstaking efforts to secure perfect

wound healing. Hence it follows that the healing of a Cesarean wound is always an uncertain factor.

4. When Cesarean section has been followed by a fever course the uterine wound should be regarded as insecure in event of a subsequent pregnancy, and should call for a repeated Cesarean section at the onset of labor.

5. Sterilization and hysterectomy should replace conservative Cesarean section when infection is known to exist. The alternative invites faulty wound healing, if not more disastrous results.

6. Transverse fundal, extraperitoneal, and cervical incisions have not lessened the liability of rupture in subsequent labors, but, on the contrary, have probably increased the hazard.

7. The possibility of rupture of the scar following Cesarean section does not justify sterilization, but rather calls for the exercise of masterly control in event of a subsequent pregnancy. All such cases should be hospital cases and labor should be anticipated by timely repetition of Cesarean section at the onset of labor if the uterine wound is known to be defective or if some cause for obstruction to the delivery of the child through the natural passage exists. Version, high forceps, uterine tampons, hydrostatic bags, and pituitrin should never be employed in the presence of a Cesarean scar.

8. Finally, we may conclude that in view of the evidence that not more than 2 per cent. of ruptures occur in subsequent labors, we are not justified in voicing the slogan "*once a Cesarean section, always a Cesarean section*," neither are we to rely explicitly upon the integrity of the uterine scar in any case. Furthermore, we would conclude that the liability of rupture is a real danger and should stand as an argument against the increasing tendency to widen the scope of elective Cesarean operations.

No.	Date.	Operator or reporter.	Indication for C. S.	Para.	Age.	No. previous C. S.	Time of rupture.	Location of C. S. incision.	Interval between C. S. and rupture.	Placental site.	
										In C. S.	In rupture.
1	1895	Koblank	Rachitis	VI	?	1	Term	Median	4 yrs.	In incision	?
2	1896	Guillaume	Rachitis	II	26	1	7 mos.	Median	3 yrs.	?	?
3	1897	Woyer	Rachitis	II	26	1	?	Median	3 yrs.	In incision	In scar
4	1900	Targett	Transv. position; tetanus uteri	?	?	1	Term	Median	2 yrs.	?	?
5	1900	Schneider	?	?	?	1	?	Median	?	?	?
6	1901	Everke	?	III	?	1	?	Median	4 yrs.	?	In tear
7	1902	Galabin	?	?	?	1	?	?	?	?	?
8	1903	L. Meyer	Lumbokyphosis	II	22	1	Term	Transv. fundal	4 yrs.	?	In tear
9	1904	Jardine	?	?	?	1	Term	Transv. fundal	?	?	?
10	1904	Kerr	?	IV	?	1	Term	Transv. fundal	3 yrs.	?	?
11	1904	Ekstein	Rachitis	IV	33	1	Term?	Transv. fundal	3 yrs.	?	In tear
12	1904	Schutte	Eclampsia	II	21	1	Term?	Median	1 yr.	?	?
13	1904	Ribemont-Dessaignes and Rudaux	?	?	29	1	Term	?	2 yrs.	?	?
14	1905	Henckel (Prussmann)	Rachitis	III	40	2	Term	Median	3 yrs.	?	?
15	1905	Werth	Rachitis	III	?	1	8 mos.	Median	12 yrs.	?	In tear
16	1905	Schink	Contr. pelvis	III	28	1	Term	Transv. fundal	3 yrs.	?	In region of scar
17	1905	Wyder (Chalewsky)	Contr. pelvis; trans. position	IV	29	1	Term?	Median	5 yrs.	?	?
18	1906	Wilton (Mabbott)	Contr. pelvis	II	23	1	Term?	Transv. fundal	2 yrs.	?	?
19	1906	A. Martin	Eclampsia	III	?	1	7 mos.	Median	2 yrs.	?	?
20	..	Couvelaire	Contr. pelvis	III	?	1	Term	Median	1 yr. 4 mos.	?	In scar
21	1907	Paddock	Contr. pelvis	VI	36	1	Term	?	?	?	?
22	1907	Schneider	Rachitis	V	25	1	Term?	Median	2 yrs.	?	?
23	1908	Hartmann (Franz)	Rachitis	II	23	1	Term?	Transv. fundal	1 yr. 8 mos.	In incision	In scar

Method of suture in C. S.	Results.		Therapy.	Remarks.	References.
	Mother.	Child.			
Silk and catgut	Recovered	Dead	Suture	Febrile convalescence after C. S.; scar much thinned.	Ztschr. f. Geb. u. Gyn., Bd. xiv.
Tier?	Recovered	Dead	Hysterectomy	Convalescence after C. S. febrile; decidua extended to peritoneum in ruptured scar	Zentralbl. f. Gynäk., 1896.
2 layers silk	Died	Dead twins	Porro	Fever after C. S.	Monats. f. Geb. u. Gyn., 1897, Bd. vi.
?	Recovered	Dead	Porro	Normal convalescence	Trans. London Obst. Soc., 1900, vol. xlii.
Not deep enough?	Recovered	Dead	Porro	.....	Deutsch. med. Wooh. Vereinsbeilage, p. 179.
"Typical Sänger"	Recovered	Lived	Porro	.....	Monats. f. Geb. u. Gyn., 1901, Bd. xiv.
?	Recovered	Dead	Porro	Tubes ligated at time of C. S.; ulcerating ventral hernia at time of rupture	British Med. Jour.
3 layers catgut	Recovered	Lived	Suture with silk	Febrile convalescence after C. S. with pelvic exudate; scar very weak	Kasuis. meddelelser. Bibliotek f. Laeger.
?	?	?	?	.....	Zentralbl. f. Gyn.
Catgut	Recovered	Dead	Porro	.....	Trans. London Obst. Soc.
3 layers catgut and silk	Died	Dead	Porro	No fever after C. S.; decidua invaded scar in its entire length; rupture after vomiting	Zentralbl. f. Gyn., 1904.
	Recovered	Dead	Laparotomy and drainage	Utero-abdominal fistula after C. S.; uterus adherent to abdominal wall	Monats. f. Geb. u. Gyn.
Silk in peritoneum	Recovered	?	Porro	.....	Comp. rend. Soc. d'obst. gyn. et ped., Paris.
2 layers catgut	Recovered	?	Suture	Decidua growing into scar; scar very thin	Ztschr. f. Geb. u. Gyn., 1905, Bd. liv.
2 layers catgut	Recovered	?	Porro	Placenta and fetus in abd. cav.; muscle union of entire scar but serosa not united?	Berl. klin. Wohnschr. Nr. 27.
2 layers catgut	Recovered	Dead	Suture	Scar consisted of serosa only; fever after rupture; suppuration; no fever after C. S.	Zentralbl. f. Gyn., 1905.
?	Recovered	Dead	Porro	Fever after C. S.	Korresp.-Blatt. f. Schweiz.-Aerzte and Chalewsky, Inaug. Diss., Zurich, 1907.
Chromic catgut	Recovered	?	Suture with chromic catgut	.....	Am. Jour. Obst., 1907, vol. xx.
?	Recovered	?	Resection scar and suture	Normal convalescence	Med. Klin., Nr. 13.
2 layers catgut	Recovered	?	Porro	Fever after C. S.; rupture just to right of scar	Ann. de Gyn., 1906, 2 serie.
3 layers catgut	Recovered	Lived	Porro	.....	Illinois Med. Jour.
?	Lived?	Lived?	Suture	Normal convalescence; tubal sterilization.	München. med. Wooh., 1907, Nr. 41
5 layers catgut	Recovered	Dead?	Vaginal hysterectomy	Scar consisted practically of serosa and invaded with decidua; rupture in centre; version and forceps delivery	Ztschr. f. Geb. u. Gyn., Bd. 8; Zent. f. Gyn., Nr. 3.

No.	Date.	Operator or reporter.	Indication for C. S.	Para.	Age.	No. previous C. S.	Time of rupture.	Location of C. S. incision.	Interval between C. S. and rupture.	Placental site.	
										In C. S.	In rupture.
24	1908	L. Meyer	Sarcoma sacri	II	25	1	Term	Transv. fundal	8 yrs.	?	?
25	1908	Lobenstine	?	?	?	2	?	Median over fundus	2 yrs.	?	?
26	1908	Fournier	Rachitis	?	?	2	?	Transv. fundal	?	?	?
27	1908	Brodhead	?	V	35	1	Term?	Median	2 yrs.	?	?
28	1909	Weber (Weil)	Contr. pelvis	?	?	1	Term?	Transv. fundal	1 yr.	In incision	?
29	1909	Nacke	Contr. pelvis	III	29	1	Term?	Transv. fundal	4 yrs.	?	In scar
30	1910	Richter	?	?	?	2	7 mos.	?	?	?	In scar
31	1910	Dahlmann	Cervix myoma	II	33	1	?	Transv. fundal	1 yr. 8 mos.	?	In region of scar
32	1910	Dahlmann	Vaginal varices	?	?	1	Term?	Transv. fundal	2 yrs.	In incision	?
33	1910	Dahlmann	Rachitis	II	21	1	Term?	Transv. fundal	3 yrs.	?	?
34	1910	Scheffzek	Contr. flat pelvis	II	23	1	Term?	Classical	3 yrs.	?	?
35	1911	Jeannin	?	?	30	1	8½ mos.	Median	1 yr.	?	?
36	1911	Schick	Edema vulva; eclampsia	III	?	1	Term	Transv. fundal	5 yrs.	?	In tear
37	1911	McPherson	?	III	25	1	In labor	Median	?	In incision	?
38	1911	Hermann	?	?	?	1	?	?	?	?	?
39	1911	Cooq and Massay	Flat pelvis	III	?	2	?	1. Trans. fundal. 2. Median	5 yrs. after 2d C. S.	?	In tear
40	1911	Unterberger	Eclampsia	II	22	1	Term?	Transv. fundal	2 yrs.		?

Method of suture in C. S.	Results.		Therapy.	Remarks.	References.
	Mother.	Child.			
Tier; 2 layers catgut	Recovered	Lived	Porro	Febrile convalescence after C. S.; ventral hernia	L'Obstétrique, Lannée, February.
3 layers catgut	Died 17 days later, pneumonia	?	Supravaginal hysterectomy	Rupture extended from os internum to fundus mid-line.	Bull. Lying-in Hosp. 1906–1907.
?	Recovered	Dead	Vaginal hysterectomy	Rupture followed induction of labor with bougie	Bull. de la soc. de gyn., April 16.
Chromic catgut	Died	Dead	Vaginal hysteerotomy	.....	Am. Jour. Obst., lvii.
3 layers catgut	Recovered	Lived	Total hysterectomy	Tear exactly in scar	Weber, Beitr. f. Geb. u. Gyn., Bd. xv; Weil, Inaug. Diss., Munich.
2 layers catgut?	Recovered	?	Suture of tear	Rupt. found on manual removal of placenta; plac. invasion of scar; death due to pul. embolism	Zentralbl. f. Gyn., 1909.
?	Died	?	Porro	Utero-abdominal fistula developed four months after C. S.	Gyn. Rundschau.
3 layers catgut	Died	?	Postmortem	Fever after C. S. with pelvic exudate; remnants of catgut sutures; decidua extended to serosa	Monatsch. f. Geb. u. Gyn., Bd. xxxii.
2 layers silk; 1st including decidua	Recovered	Dead	Hysterectomy	Mucosa extended to serosa; fistula dev. one mo. after C. S., due to silk suture; healed on its removal.	Monatsch. f. Geb. u. Gyn., Bd. xxxii.
3 layers catgut	Recovered	Lived	Scar resected and suture	Fever after C. S.; no symptoms of rupture before operation; scar in unruptured part very thin	Monatsch. f. Geb. u. Gyn., Bd. xxxii.
?	Died	Dead	Porro	Fever after C. S.; abdom. suture infection; scar adherent to abdom. wall and ruptured in entire length	Ztschr. f. Geb. u. Gyn., Bd. lxvii, Hft. 3.
"Exact suture" Reindeer tendon	Recovered	Dead	Porro	No fever after C. S.; rupture in spite of weak labor pains; scar thick with evidence of complete muscle healing	L'Obstétrique, 1911. No. 3.
2 layers silk	Died	Lived	?	Version and extraction; rupture then found with placenta in abdominal cavity; autopsy; scar very thin; decidua extended to serosa	Deutsch. med. Wooh.
?	Recovered	Lived	Resection scar and suture	Protracted fever after C. S.; unruptured part of scar very thin; resection of tubes	Am. Jour. Obstet., 1911, lxiii, 3.
?	?	?	?	Rupture in region of scar; fetus and membranes in abdominal cavity.	Acad. de méd. de Belgique., v. Cooq., No. 38.
?	Died	Dead	?	Rupture in clinic; rupture in form of "T;" fundal scar only serosal union; syncytial elements invaded muscle in median scar	Rev. mens. de gyn., d'obst. et ped.
?	Recovered	Dead	Supravaginal amputation	No fever after C. S.; vaginal hysterectomy; rupture then found in old scar, which was very thin	Monatsch. f. Geb. u. Gyn., Bd. xxxiv Heft 3.

No.	Date.	Operator or reporter.	Indication for C. S.	Para.	Age.	No. previous C. S.	Time of rupture.	Location of C. S. incision.	Interval between C. S. and rupture.	Placental site.	
										In C. S.	In rupture.
41	1912	Schwartz	Eclampsia; edema vulva	II	30	1	8 mos.	Transv. fundal	3½ yrs.	?	?
42	1912	Ramos	Eclampsia	II?	?	1	8½ mos.	Transv. fundal	1½ yrs.	?	?
43	1912	v. Herff (Wyss)	Edema vulva; eclampsia	II	27	1	About term	Median	1 yr. 8 mos.	?	In tear
44	1912	Wyss	Rachitis	II	26	1	Term	Classical	3 yrs. 3 mos.	In incision	On posterior wall
45	1912	Jolly	Rachitis	IV	27	1	Term	Median on posterior wall	1 yr. 3 mos.	Anterior wall	?
46	1912	Hofmeier (Fischer)	Contr. pelvis	V	38	2	8½ mos.	1. Transv. fundal; 2. ?	6 yrs.	1. In incision; 2. ?	Partly over tear
47	1912	Davis (?) (Harrar)	Flat pelvis	VIII	35	1	In labor	Median	2 yrs.	?	In tear
48	1912	Davis (?) (Harrar)	Contr. pelvis	V	37	3	11 mos.	All longitudinal	3 years after 3d C. S.	?	?
49	1914	Wolff	Rachitis	II	30	1	Term	Cervical extending into body	1 yr.	?	?
50	1913	Davis	Kyphotic dwarf	II	?	1	In labor	Median through fundus	1 yr.	?	?
51	1913	Weisschadel (Everke)	Contr. pelvis	II?	?	1	Term	Transv. fundal	4 yrs.	?	?
52	1914	Walls	Dwarf	?	30	3	7 mos.	?	1 yr.	?	Over scar
53	1914	Walls	Contr. pelvis	?	?	1	Term	?	?	?	?

Method of suture in C. S.	Results.		Therapy.	Remarks.	References.
	Mother.	Child.			
3 layers catgut	Recovered	?	Supravaginal amputation	Slight fever on third day after C. S.; rupture through entire length of scar; fetus and placenta in abdominal cavity	Monatsch. f. Geb. u. Gyn., Bd. xxxv, Heft 5.
Silk	Recovered	Dead	Supravaginal amputation	Four days after C. S. abdominal wound separated with eventration; at rupture fetus and placenta in abdominal cavity	Revue de la clin. obs. et gyn., January and February, 1912 ref., Ztschr. f. Gyn., 1913, Nr. 8.
2 layers silk	Recovered	Dead	Porro	Rupture after vomiting; scar thin in fundal region only of mucosa and serosa; synoytial invasion of scar	Beitr. f. Geb. u. Gyn. Bd. xvii, Heft 3.
2 layers catgut	Recovered	Lived	Porro	Fever after C. S.; scar thin in places; some muscle fibers in more solid part of scar	Beitr. f. Geb. u. Gyn. Bd. xvii, Heft 3.
2 layers cargut	Recovered	Lived	Supravaginal amputation	Fever after C. S.; decidua extended to serosa; unruptured part of scar showed complete muscle union	Arch. f. Gyn., Bd. 97, Heft 2.
1 deep silk; 3 layers catgut	Died	Dead	Supravaginal amputation	Fever after C. S.; at 2d C. S. scar found to be thin; no fever after 2d; complete rupture of scar which consisted of serosa only with decidua and syncytial tissue	Ztschr. f. Geb. u. Gyn., 1912, Bd. lxx, Heft 3.
?	Recovered	Lived	Resection of scar and suture	.....	(Harrar) Am. Jour. Obst., 1912, lxv, 5.
?	Died	Dead	Hysterectomy	Fever after 3d C. S.; complete muscle regeneration; rupture between two of the scars; overtime fetus and placenta in abdominal cavity	(Harrar) Am. Jour. Obst., 1912, lxv, 5.
2 layers catgut	Recovered; cerebral embolism on tenth day	Dead	Total hysterectomy?	Fever after C. S. with utero-abdominal fistula; rupture through scar which was thin with decidua extending almost to serosa	Ztschr. f. Geb. u. Gyn., 1914, Bd. lxxv, Heft 3.
?	Died	Dead	Suture	Normal convalescence after C. S.; rupture of entire scar; fetus and placenta in abdominal cavity	Trans. Am. Assn. Obstet. and Gyn., 1913, xxvi, 43.
?	Recovered	?	Supravaginal amputation	Fever after C. S.; complete rupture of scar; fetus and placenta in abdominal cavity; scar of serosa only	Monatsch. f. Geb. u. Gyn., 1913, Bd. xxxvii, Heft 2.
?	Died	Dead	Supravaginal amputation	.....	Jour. Obstet. and Gyn. Brit. Emp., 1914, xxvi, No. 4.
?	?	Dead	Supravaginal amputation	Scar long, wide and thin, and about to give way; small opening in lower angle of scar; section showed no degenerative changes to account for rupture	Jour. Obstet. and Gyn. Brit. Emp., 1914, xxvi, No. 4.

No.	Date.	Operator or reporter.	Indication for C. S.	Para.	Age.	No. previous C. S.	Time of rupture.	Location of C. S. incision.	Interval between C. S. and rupture.	Placental site.	
										In C. S.	In rupture.
54	1914	Shaw	?	?	?	1	Term?	?	20 mos.	?	In tear
55	1914	Breitstein	?	?	?	1	Term?	?	?	?	?
56	1914	Franz	Rachitis	II	24	1	7 mos.; plac. previa	Median (low)	1 yr.	?	Not in tear
57	1903	Futh (Kretz)	?	II	25	1	?	?	1 yr.	?	?
58	1914	Applegate	Contr. pelvis	II	30	1	?	Median	18 mos.	?	?
59	1913	Webster (Davis)	Nephritis	III	37	1	Term?	Median	?	?	?
60	1914	Hillis, D. S.	Eclampsia	II?	?	1	Labor	Median	1 yr.	?	?
61	1915	Williams, J. W.	Contr. pelvis	III	?	1	7 mos?	Median	1 yr. 2 mos.	?	?
62	1914	Miller (Jeff.)	Failure of head to engage	I	30	1	In labor full term	Median	15 mos.	Right of incision	Over scar
63	1915	Miller (Jeff.)	Slight contraction	II	18	1	In labor full term	Median (low)	1 yr.	?	Not in tear

Method of suture in C. S.	Results.		Therapy.	Remarks.	References.
	Mother.	Child.			
?	Recovered	Dead	Supravaginal amputation	Entire scar ruptured; section showed increase in fibrous tissue but insufficient to account for accident	Jour. Obstet. and Gyn. Brit. Emp., 1914, xxvi, No. 4.
?	?	?	Hysterectomy	After C. S. a 2d labor terminated per viam naturalem; rupture in third pregnancy.	Jour. Am. Med. Assn., 1914, lxii, 689.
?	Died	Dead	Hysterectomy	Induction of labor by bag; rupture in a half hour of entire length of scar, which was thin and only fibromusoular tissue	Not reported; personal observation.
2 layers	Recovered	?	Porro	Fever after C. S.; placenta not found (?); pathological insertion of placenta (?)	Zentralbl. f. Gyn. (?), ref., Wyss, Beitr. f. Geb. u. Gyn., Bd. xvii, Heft 3.
?	Died	Dead	Hysterectomy	Fever after C. S.; in hospital two months; scar very thin, showing evidence of poor union.	Not reported; personal communication.
?	Died	Dead	None; rupture found at autopsy	No history obtainable; induction of labor with bag, version, and extraction; dead fetus; died two hours later; autopsy revealed rupture along entire scar and extending toward left tube	Surg., Gyn. and Obstet., July, 1913.
3 layers catgut	Recovered	Dead	Suture	Rupture in scar through entire length; rupture two hours after onset of labor	Not reported.
?	Recovered?	Dead	Supravaginal amputation	Fever after C. S.; rupture probably occurred two days before operation; no suggestion of rupture; intact sac and placenta in abdominal cavity	Not preported; personal communication.
3 layers 20-day catgut	Died	Dead	Suture of rupture	Ruptured on operating table in preparation for C. S.; death from shock in three hours; fever course after C. S.	Not reported.
?	Recovered	Dead	Suture of rupture	Fever course following C. S.; prolonged labor; entered hospital after rupture; pituitrin given by midwife prior to rupture.	Not reported.

Bibliography

Abel. Arch. f. Gyn., Bd. lviii.

Adenot. Lyon Médical, Jan., 1907, No. 1, p. 16.

Audebert and Fournier. Congres de gyn., d'obstr. et de ped., Toulouse, 1910, C. R., p. 751.

Audebert. Ann. de gyn. et d'obstr., May, 1913. (Abst. Am. Jour. Obst., lxviii, 3, p. 587.)

Bandl. Rupture der Gebarmutter, Wien, 1875.

Bar. Semaine méd., Febr., 1887, No. 7, p. 38.

Bar. Leçons de pathol. obstetricale, Paris, 1900.

Bar. Bull. Médical, June, 1911, p. 513.

Banby and Giles. Toulouse méd., No. 21, Nov., 1903, p. 241.

Berlin. De l'operatione Ceserienne (publ. O. Doin, Paris, 1890).

Birnbaum. Arch. f. Gyn., Bd. xxv.

Boquell. (in Guillet) Thèse de Paris, 1903–04, No. 330.

Boquell. La practique de la dystocie (publ. O. Doin, Paris, 1908).

Boquell. Soc. obstr. de France, 1908, C. R., p. 178.

Blind. Zent. f. Gyn., 1893.

Bouffe de Saint-Blaise. Soc. d'obst., de gyn. et de ped. de Paris, Jan., 1911, C. R., p. 14.

Boyd. Am. Jour. Obst., Aug., 1909.

Brandt. Vth Internat. Congress, St. Petersburg, 1910, C R., p. 47.

v. Braun. Arch. f. Gyn., Bd. lix.

v. Braun. Zent. f. Gyn., 1895.

Breitstein. Jour. Am. Med. Assoc., 1914, lxii, p. 689.

Brodhead. Am. Jour. Obst., 1908, vol. lvii.

Brindeau. L'obstètrique, Jan., 1909, p. 36.

Bue. Soc. Obst. de France, 1908, C. R., p. 164.

Bumm. Vth Internat. Congress, St. Petersburg, 1910, p. 39. (Abst. Monatsch. f. Geb. u. Gyn., Bd. xxxii, p. 619.)

Child. Am. Jour. Obst., 1914, lxx, i, p. 65.

Chroback. Zent. f. Gyn., 1905.

Chroback and Schauta. In Pehams "Das enge Becken."

Cocq and Masay. Rev. mens. de gyn., d'obst., etc., May, 1911, p. 265. (Abst. Zent. f. Gyn., 1911, Nr. 48, p. 1655.)

Couvelaire. Ref. Zent. f. Gyn., 1907, ii, p. 1516.

Couvelaire. Ann. de gyn. et d'obst., Mar., 1906, p. 148.

Couvelaire. Ann. de gyn. et d'obst., Nov., 1909, p. 657.

Couvelaire. Pratique medico-chirurgicalie (publ. Masson, Paris, 1911.)

Couvelaire. Introduction a' la chirurgie uterine obstetricale (publ. Steinheil, Paris.)

Davis, A. Trans. Am. Assoc. Obst. and Gyn., 1913, p. 43.

Davis, A. Trans. Am. Assoc. Obst. and Gyn., 1914, xxvi, p. 307.

Davis, C. Surg., Gyn. and Obst., 1913, xvii, 1, p. 51.
Dahlmann. Monatsch. f. Geb. u. Gyn., Bd. xxxii, H. 1, p. 33.
Demelin. Soc. d'obst. de gyn. et de ped. de Paris, June, 1908, p. 124.
Delle, Chaiji. Rev. mens. de gyn., d'obst. et de ped., Apr., 1914. (Abst. Am. Jour. Obst., lxx, No. 2, p. 271.)
Doleris. Soc. d'obst. et gyn. et de ped. de Paris, June, 1909, p. 189.
Doleris. Vth Internat. Congress, St. Petersburg, 1910.
Duhrssens. v. Winckel's Handbuch d. Geb., Bd. iii, i.
Ekstein. Zent. f. Gyn., 1904, Nr. 44, p. 1302.
Essen-Moller. v. Winckel's Handb. d. Geb., Bd. iii, i.
Everke. Monatsch. f. Geb. u. Gyn., Bd. xiv, H. 5, p. 637.
Everke. Monatsch. f. Geb. u. Gyn., 1913, Bd. xxxvii, H. 2, p. 238.
Everke. Zent. f. Gyn., 1898.
Frigyesi. Zent. f. Gyn., 1910, Nr. 26, p. 883.
Fabre. Lyon Médical, Jan., 1907, No. 2, p. 45.
Fabre. Lyon Médical, Dec., 1907.
Feis. Arch. f. Gyn., Bd. lxxxix.
Fiuex. (in Loubat) Thèse de Bordeaux, 1909–10, No. 31.
Flesch. Zeitsch. f. Geb. u. Gyn., 1910, Bd. lxvi.
Flint. Am. Jour. Obst., lxix, 3, p. 484.
Fritsch. Verhandl. d. Gesellsch. f. Gyn., Wien, 1895, Bd. vi.
Fritsch. Zent. f. Gyn., 1897, p. 561.
Fournier. Soc. d'obst. de Paris, Apr. 19, 1906.
Fruhinholz. Ann. de gyn. et d'obst., Mar., 1906, p. 135.
Fruhinholz and Michel. Ann. de gyn. et d'obst., Jan., 1907, p. 23.
Fischer. Zeitsch. f. Geb. u. Gyn., 1912, Bd. lxx, H. 3, p. 838.
Ferre. Ann. de gyn. et d'obst., 1914, xli, 160.
Garipuy. Presse médicale, July, 1909.
Garipuy. Soc. d'obst. de Toulouse, June, 1910, C. R., p. 287.
Guillaume. Ref. Zent. f. Gyn., 1896.
Good. Boston Med. and Surg. Jour., 1913, clxix, 345.
Gibbon. Trans. Edinb. Obst. Soc. (Abst. Zent. f. Gyn., 1912, Nr. 28, p. 939.)
Harrar. Am. Jour. Obst., lxv., 5, p. 808.
Hartmann. Zeitsch. f. Geb. u. Gyn., Bd. lxii, H. 3.
Hartmann. Ref. Zent. f. Gyn., 1913, Nr. 28, p. 1048.
Hartmann. Gyn. Rundschau, Jahr. iv, 22–23.
Hartmann. Zent. f. Gyn., 1910, Nr. 28, p. 937.
Haven-Young. Am. Jour. Obst., 1903, xlviii.
Herrgott. Ann. de gyn. et d'obst., Aug., 1902, p. 95.
Herrgott. Ann. de gyn. et d'obst., Jan., 1906, p. 1.
Herrgott. Ann. de gyn. et d'obst., Nov., 1909, p. 690.
Holzapple. Samlung klin. Vortrage Gyn., Nr. 196–197.
Jeannin. L'obstètrique, Mar., 1911, No. 3, p. 316.
Jeannin and Wilhelm. Bull. de la soc. d'obst. de Paris, No. 8, Nov., 1910.

Jolly. Ref. Zeitsch. f. Geb. u. Gyn., lxxi, H. 3, p. 650.
Jolly. Arch. f. Gyn., 1912, Bd. xcvii, H. 2, p. 229.
Kehrer. Beitr. f. Geb. u. Gyn., 1909, Bd. xiv.
Kerr. Trans. Obst. Soc., London, 1905, xlvi, p. 309.
Kerr. Operative Midwifery (publ. Bailliere Tindall and Cox, London, 1908.)
Kleinhaus. v. Winckel's "Handb. d. Geb."
Krukenberg. Arch. f. Gyn., 1886, Bd. xxviii.
Kustner. Zent. f. Gyn., 1909.
Kustner. Zeitsch. f. Geb. u. Gyn., 1908, lxiii, H. 3, p. 407.
Keweloh. Inaug. Diss., Wurtzberg, 1911. (Abst. Zent. f. Gyn., 1903, Nr. 8, p. 294.)
Labhardt. Zeitsch. f. Geb. u. Gyn., Bd. liii.
Latzko. Wiener klin. Wochensch., 1909.
Lepage. Soc. d'obst. de gyn. et de ped. de Paris, Oct., 1906, C. R., p. 177.
Lepage. Soc. d'obst. de gyn. et de ped. de Paris, Dec., 1906, C. R., p. 415.
Lepage. Bull. Méd., May, 1907.
van Leuwen. Ann. de gyn. et d'obst., Oct., 1904, p. 577.
Leopold. Arch. f. Gyn., 1910, Bd. xci.
Leopold. Arch. f. Gyn., Bd. lxxxi, p. 407.
Lichenstein. Zent. f. Gyn., 1910, Nr. 26.
Litschkuss. Ref. Jour. Obst. and Gyn. Brit. Emp., xxii, No. 2, p. 110.
Lihotzky. Zent. f. Gyn., 1905, Idem, 1895.
Lobenstine. Am. Jour. Obst., lviii, 4, p. 670.
Lange. Monatsch. f. Geb. u. Gyn., 1913, xxxvii, 681.
Lovrich. Zent. f. Gyn., 1910, Nr. 29, p. 993.
McPherson. Am. Jour. Obst., lxiii, 3, p. 399.
Mason and Williams. Bost. Med. and Surg. Jour., 1910, clxii, 65.
Marioton. Arch. mens. d'obst. et gyn., 1912, March.
Marioton. Thèse de Paris, 1911–12, No. 4.
Mauclaire and Burnier. Arch. Gén. de Chir., Aug., 1908. (Abs. Am. Jour. Obst., 1908, lviii, 6, p. 1071.)
Meyer. L'obstétrique, 1910, Nos. 1–6.
Meyer. L'obstétrique, 1908, Feb., p. 89.
Meyer. Zent. f. Gyn., 1903.
Meyer. Monatsch. f. Geb. u. Gyn., 1910, xxxi, H. 3, p. 368.
Mouchotte. Ann. de gyn. et d'obst., Nov., 1908, p. 663.
Nacke. Zent. f. Gyn., 1909, Nr. 6, p. 313.
Nuville. Thèse de Toulouse, 1900–11.
Olow. Zent. f. Gyn., 1910, Nr. 31, p. 1047.
Olshausen. Zeitsch. f. Geb. u. Gyn., 1905, Bd. liv, p. 370.
Olshausen. Ann. de gyn. et d'obst., Nov., 1897, p. 377.

Olshausen. Inaug. Diss., Berlin, 1898, p. 26.
Oui. Soc. d'obst. et de gyn. et de ped. de Paris, Feb., 1908, C. R., p. 48.
Opitz, E. Der abdominal Kaiserschnitte, Deutsche Frauenheil. Bd., ii, Wiesbaden, 1915.
Pflanz. Zent. f. Gyn., 1910, Nr. 52, p. 1693.
Paucot. Reunion obsttricale de Lille, Dec., 1910, C. R., p. 86.
Peham. Das enge Beckens, Wien, 1908.
Pestalozza. Ann. di ostetricia e ginecologia, Nov., 1910, No. 11, p. 781.
Pinard. Ann. de gyn. et de obst., Sept., 1907, p. 513.
Planchu. Lyon Méd., 1911, No. 33.
Planchu. Lyon Méd., 1913, No. 46.
Planchu. Reunion obst. de Lyon, Dec., 1909, C. R., p. 421.
Potochi. Ann. de gyn. et d'obst., Mar.–June, 1886, Idem, Dec., 1889.
Potocki. Ann. de gyn. et d'obst., Feb.–Mar., 1890, Idem, 1906, p. 261.
Potek. Zent. f. Gyn., 1913, Nr. 30, p. 1105.
Prussmann. Zeitsch. f. Geb. u. Gyn., 1905, Bd. lv, p. 415.
Ramos. Rev. de la cli. obst. et gyn., Jan. and Feb., 1912. (Abst. Zent. f. Gyn., 1913, Nr. 8, p. 296.)
Ribemont-Dessaignes et Rudeaux. Soc. d'obst. de gyn. et de ped. de Paris, Apr., 1904, C. R., p. 139.
Richter. Ref. Zent. f. Gyn., 1910, Nr. 5, p. 141.
Ritschl. Virchows Arch., Bd. cix, p. 507.
Rohrbach. Zeitsch. f. Geb. u. Gyn., lxxv, H. 3, p. 544.
Routh. Jour. Obst. and Gyn. Brit. Emp., 1911, xix, No. 1.
Sänger. Der Kaiserschnitte bei Uterus-fibromen nebst vergleichender Methodik, etc., Leipzig, 1882.
Schauta. (in Neumann) Arch. f. Gyn., 1906, Bd. lxxix, p. 1.
Schauta. Zent. f. Gyn., 1885.
Schauta. Zent. f. Gyn., Nr. 9, p. 281.
Scheffzek. Zeitsch. f. Geb. u. Gyn., Bd. lxvii, H. 3, p. 752.
Schick. Deutsche med. Wochensch., 1911, Nr. 37.
Schier. Ueber den Indikations zum Kaiserschnitte u. der Wert, Wurtzburg.
Schwartz. Ref. Monatsch. f. Geb. u. Gyn., xxxv, H. 5, p. 651.
Schneider. Münch. med. Wochensch., 1907, Nr. 41.
Scipiades. Gyn. Rundschau, 1910.
Scipiades. Verhandl. d. deutsch. Gesellsch. f. Gyn., xii, 1907.
Singer. Thèse de Paris, 1908–09, No. 449.
Shaw. Jour. Obst. and Gyn. Brit. Emp., 1914, xxvi, 4, p. 232.
Studdiford. Am. Jour. Obst., 1914, lxix, p. 480.
Traugott. Monatsch. f. Geb. u. Gyn., 1911, Bd. xxxiii, H. 3, p. 379.
Tissier. Soc. Obstet. de France, 1909, C. R., p. 210.

Targett. Trans. Lond. Obst. Soc., 1900, p. 244.
Tull. Am. Jour. Obst., Dec., 1906.
Unterberger. Monatsch. f. Geb. u. Gyn., xxxiv, H. 3, p. 372.
Vasseur. Thèse de Lille, 1907–08, No. 21. Ref. Zent. f. Gyn., 1909, p. 853.
Veit. Vth International Congress, St. Petersburg, 1910, C. R., p. 117.
Vogel. Monatsch. f. Geb. u. Gyn., xxviii, H. 1, p. 459.
Vogt. Arch. f. Gyn., 1911, Bd. xcv, H. 1, p. 13.
Wallace. Jour. Obst. and Gyn. Brit. Emp., 1902, Dec., p. 555.
Walls. Jour. Obst. and Gyn. Brit. Emp., 1914, xxvi, 4, p. 232.
Werth. Berliner klin. Wochensch., 1905, Nr. 27.
Werth. Zent. F. Gyn., 1903.
Williams. J. T. Am. Jour. Obst., 1916, lxxiii, March.
Wolff. Zeitsch. f. Geb. u. Gyn., 1914, lxxv, p. 740.
Woyer. Monatsch. f. Geb. u. Gyn., 1897, Bd. vi, p. 192.
Wyss. Beitr. f. Geb. u. Gyn., 1912, xvii, H. 3, p. 337.
Zallewski. Ref. Jour. Obst. and Gyn. Brit. Emp., xxiv, 6, p. 321.
Zweifel. (in Abel) Arch. f. Gyn., lviii, p. 339.
Ziegler. Traite d'anatomie pathologique général et speciale.

DISCUSSION

Dr. George Tucker Harrison.—I have listened to Dr. Findley's paper with great pleasure and have enjoyed it very much. I congratulate the doctor on the ability with which he has studied and illustrated the principles governing the treatment of such cases as he has outlined in his paper. One thing above all I admire, not only in this paper but in all the previous papers that have been presented, particularly the discussions on syphilis and cancer, is the one which relates to statistics. I have great admiration for a gentleman who gets up statistics. It has been said that you can prove anything you please with statistics, and it makes no particular difference on which side a man may be, but if he is treating carcinoma and presents statistics of his methods of treatment, they will prove that his position is correct. One great objection I have to statistics is that they are an infernal bore. I cannot present any statistics regarding the subject of rupture of the uterus under consideration, but I have seen rupture in the scar following Cesarean section which is the subject of this paper.

I agree with the conclusions of Dr. Findley in the main except one. The scars seen by Dr. Findley were perfect, yet he says rupture has occurred in some cases. The scars I have seen have been perfect following Cesarean section except in one case, in which, when we opened the abdomen we found a bad rupture; but if the suturing is properly done, there is no danger.

A point I would take issue with him is in regard to the necessity of delivering a woman by Cesarean section who is pregnant a second time. The first time she undergoes Cesarean section scar tissue is formed. I would deliver such a woman by version who has a narrow pelvis if the pelvis is not too contracted. In the first place, I do not use high forceps in such cases as that. I think it is contra-indicated. I have always opposed the use of high forceps. As I have said before obstetrical societies at different times, while the man is fooling with high forceps I am home and asleep. (Laughter.)

Dr. Charles M. Green.—I would like to speak on one point of Dr. Findley's paper,—the strength of the uterine scar after Cesarean section. We all know that if the uterus is infected and the woman recovers, she is liable to have a weak scar which may rupture in subsequent labor or even in pregnancy, unless, by chance, extensive adhesions firmly attach the anterior surface of the uterus to the abdominal wall: it may be recalled that I have reported one such case in which section was repeated four times, through the abdomino-uterine wall, without entering the peritoneal cavity.

I wish to express my belief, however, that in the absence of infection, if the uterine incision is properly closed, the scar will be as strong as, or even stronger than, the uterine wall elsewhere; and I have yet to learn of a single instance of post-Cesarean rupture of the uterus among the cases on which I have operated. Not only that, but in a small proportion of cases women delivered by gastrohysterotomy have subsequently had normal or low-forceps labors under my observation without uterine rupture. But if dependence is to be placed on the strength of uninfected uterine scars, it is my opinion that the uterine incision should not be sutured until the wall has been considerably thickened by some hours of labor. In a recent paper on Cesarean section[1]

[1] Boston Medical and Surgical Journal, vol. clxxiv, No. 13, March 30, 1916.

I have expressed my opinion, based on observation and experience, that except in obstetrical emergencies, which arise in some cases of toxæmia with convulsions, placenta prævia, ruptured uterus, and organic heart disease, it is for the best interest of mother and child to defer operation, whether the indication be absolute or relative, not only until the advent of labor, but for some three to even eighteen hours thereafter, if the first stage should last that long. I will not here rehearse the several reasons for my opinion given in the paper referred to, except insofar as they relate to the strength of the uterine scar. We know that the thickness of the uterine wall at full term is not more than one-sixth to one-quarter of an inch; and while we know that incision of this thin wall and removal of the uterine contents are immediately followed by a certain amount of wall-thickening, we also know that uterine muscular retraction is a gradual process beginning with the labor, and that it takes some hours of uterine contractions for the wall to thicken to an inch or more. If sutures are applied to the thin uterine wall, the scar will surely be thin; the presence of the sutures prevents the normal thickening which would otherwise take place in the process of uterine retraction. This year I did a second Cesarean section (the first not my own) on a woman who had been in labor for some hours. Incision was made in the line of the former, and it was found that while the uterine wall generally was considerably retracted, the wall was very thin in the incision line.

It has seemed to me that rather than put sutures in a thin-walled, unretracted uterus, and thereby prevent the usual physiological muscular thickening and formation of safe scar, it would be better, in sections performed for good reason before the advent of labor, to apply no muscular sutures at all, but simply to close the peritoneum and leave the muscle to close by physiological retraction and subsequent involution. A case which would support this view, a case of extensive spontaneous uterine rupture, from labor obstructed with shoulder presentation, I thus dealt with. The rupture extended from well up into the corpus on the left, obliquely down across the bladder reflex and over the right broad ligament: I sutured the uterine muscle until the bladder was reached, and then it was possible, for a hand-breadth, to suture only the peritoneum; yet at the close of the normal puerperium I was able to satisfy myself,

by bimanual intra-cervical-abdominal palpation, that the uterine wall was thick and firm at the seat of the unrepaired muscular rent; and the strength of the scar was demonstrated by the fact that the woman subsequently went through labor with a breech presentation and manual extraction without detriment.

With Dr. Findley I take, and always have taken, issue against the precept "Once a Cesarean, always a Cesarean." Of course when the indication for gastrohysterotomy is absolute, repeated sections must be performed. But it is surely true that after section for a relative disproportion between passage and passenger, or for relative uterine inefficiency, after a careful suture of the uterine wall reasonably retracted by some hours of labor, and after an afebrile convalescence, the uterine scar is sufficiently strong to permit of safe delivery *per pelvim* in a subsequent labor when no disproportion exists. I have observed a number of such cases and have yet to see the uterus rupture under these circumstances. If, however, a first section has been followed by afebrile, septic convalescence, no certainty can be felt of the strength of the uterine scar. I will add that I have observed a considerable number of cases, allowing them to go from four to twelve or eighteen hours in first-stage labor with unruptured membranes and *without vaginal examinations*, and then performed section, without apparent detriment to mother or child; and I have pointed out, in the paper before referred to, several advantages of this method over my former custom of operating before the advent of labor.

Dr. John Osborn Polak.—To support what Dr. Green has said relative to retraction of the uterus, sixteen abdominal sections for rupture of the uterus have been rather enlightening to me, to see what actually happens inside the abdomen. Out of sixteen there were nine in which the rupture had taken place through the posterior wall in the lower uterine segment, not involving the lateral vessels, all complete tears. These patients were in deep shock at the time of admission. On opening the abdomen it was remarkable to see how little blood there was inside the abdomen. There was actually less blood inside the abdomen than we would find in almost any ectopic. In each of those where the child had escaped, the uterus had retracted. And in those where the child had not escaped, the child acted as a tampon. It was amazing to see the amount of contraction of these wounds.

There is one point I wish to bring out which was referred to by both Dr. Findley and Dr. Green, and that is the importance of infection following uterine section. In our late cases we found there was a morbidity of nearly 50 per cent. I think we all admit that a properly sutured uterine wound will heal per primam, and all have seen on subsequent section that these wounds are thicker or as thick as the rest of the uterus in which the blood supply has been perfectly established. On the other hand, in those cases where the membranes have been ruptured before admission to the hospital, a larger proportion have a morbidity and our experience has been considerable, 121 sections by ourselves and my assistants, with three deaths, shows that the technic is not very faulty, yet we have had a 50 per cent. morbidity in our infected cases. This has led us to adopt the extraperitoneal method. Whether this will enable us to attain any better results or not, is a question for us to determine. I know as yet so little about the extraperitoneal low incision that I cannot make any definite statements regarding it.

Dr. Edward P. Davis.—The paper of Dr. Findley is of very great interest to us all, and I think with his conclusions we are generally in accord. We recognize the importance of closing the uterine muscle separately.

Personally, my experience in the so-called Sanger's Cesarean section numbers 151 cases up to the present time, with one death, the method employed being to suture the uterine muscle separately with silk, and the peritoneum with fine silk or catgut. So far as I have been able to trace my cases, I have had no case of rupture in any of these scars. A negro woman, with a moderately contracted pelvis, on whom section was done years ago, has declined to enter the hospital for subsequent confinements, and allow the out-patient service to attend her. She has had a number of children by spontaneous parturition. Another woman, a very nervous woman, declined to have a section in her next confinement, who was delivered with forceps without much weakening of the tissues. As I have remarked, so far I have had no rupture of the scar I could trace. None have come under my observation in my own cases.

I think we all recognize the importance of infection as predisposing to rupture; at the same time, we hesitate to sacrifice the uterus in late and possibly infected cases. What shall we

do? Our results have been good by irrigating the uterus with hot salt solution, and packing it with 10 per cent. iodoform gauze, carrying the gauze down through the cervix, whence it is removed through the vagina subsequently. These women have made good recoveries, and some of them have come to labor subsequently and have been delivered spontaneously, so that we hoped in that manner to save the uterus and so far have been successful.

I have seen a number of cases bearing out the observations made by Dr. Green and Dr. Polak, and what they have said is quite in accord with my own experience, namely, that the uterus tends to close the wound of incision or rupture, independently of labor. That is the tendency of the uterus. If that is the case, there is no necessity of concerning one's self with the time at which section should be done.

Dr. Green has called attention to the fact that in his experience and observation it is necessary to secure uterine action for sometime to bring about a thick walled wound favorable for suturing. What shall we do in those cases where the women have no labor whatsoever? Do we have a thin uterine wall at these operations? Are these patients subject to rupture of the uterus should they become pregnant again? I have in such a case delivered a patient by Cesarean section and have subsequently delivered the same woman by another elective Cesarean section without a pain of labor. I could find none of my original silk sutures, and the uterine wall thickened promptly as soon as touched by the knife. My feeling is this, that the greater danger of relaxation and thinning of the uterine wall arises from exhaustion. I am quite sure of that, and anything that predisposes to exhaustion is going to give us a troublesome time in doing a section, and hence I would far rather, having decided upon section, operate as soon as there was moderate dilatation for drainage and spare my patient the possible risk of relaxation and a thin wall than wait for further uterine action. I believe no one can do this section without stimulating the uterine muscle to contract, and here is a good use for pituitrin and an excellent use for strychnin and for ergot administered hypodermically at the time of operation. However, I would differ from my esteemed friend Dr. Green, as I have no reason, so far as my experience goes, to wait for the thick walled uterus. I do not wait because I should fear exhaustion. I have no fear

in closing the uterus and having aseptic healing, even though there may be rupture of the scar afterward, but with Dr. Findley I quite agree that these patients should be under hospital observation or in out-patient service in subsequent confinements.

Dr. Walter W. Chipman.—I thoroughly agree with the note of warning that Dr. Findley has enunciated, that, after all, Cesarean section is not perhaps so simple as we are apt to think, and it is not to be employed in each and every emergency.

Speaking generally, I believe we are apt to stitch the uterine wound too carefully and to tie the sutures too tightly. My own plan is this: I carefully approximate the mucosal edges of the uterine wound and secure wide apposition of its raw surfaces, especially in the vascular zone; I draw the sutures rather loosely and at the same time, attempt to shorten the incision by drawing its two ends somewhat together. The whole object is to secure wide approximation and to control the blood supply, to approximate carefully the mucosal edges, and to tie the suture not too tightly. We all remember the famous classic case of the man who performed his Cesarean section. The woman was in extremis and he did not close the uterine incision at all, but simply closed his abdominal incision. Much to his surprise the woman recovered, I say again that I believe we are inclined to tie the uterine sutures too tightly. I have had two cases of women on whom I have done a second Cesarean section. In both of them I searched for the old uterine incision but could not find it. There was no scar that I could discover. I could not tell where the old incision had been made.

I had one lesson, I may say that I have had a number of lessons. One thing I rather dread is to perform a Cesarean section in a case complicated with uterine fibroids. In the future I shall be very careful in making the uterine incision to avoid the fibroid—even if it is only the size of a plum or an egg. The larger the fibroid the greater the danger. The reason is this: In one case I had a year and a half ago I performed Cesarean section where the uterus contained multiple fibroids and I cut the blood supply to one of these nodules, the size of a hen's egg; the blood supply that has been so well demonstrated to us by Dr. Sampson. Unfortunately the woman died, and the postmortem findings showed necrosis of that fibroid nodule and this evidently had been the starting point of the general

infection. I should say then, in a case of fibroid or multiple fibroids, see to it that the incision is made some distance away from the fibroid or in such a case perform a Porro-Cesarean operation.

The mortality in these cases of rupture of the scar, as Dr. Findley has shown to us, is surprisingly small. The reason, of course, is that in the area in which the incision has been made, that area is comparatively non-vascular, and we would get much less severe hemorrhage than in traumatic or spontaneous rupture of the uterus where the large vessels of the lower uterine segment are involved.

I would like to ask Dr. Findley to give us his view of Cesarean section in the toxemias of pregnancy. That is a subject that has interested me very much. We all know in severe toxemias wound healing is slow, retarded and imperfect. I would like to ask him if the healing of the abdominal incision can be taken as an index to the healing of the uterine wound?

Dr. C. Jeff. Miller.—I am sorry I did not hear Dr. Findlay's paper, but since I had the privilege of listening to his conclusions, I know something of the ideas he wishes to emphasize.

I have had two cases of rupture of the uterus following Cesarean section. One of these was operated upon by me just after the rupture. She had had a Cesarean section performed in Chicago about one year before she entered my emergency service.

The second case occurred in the hands of one of my assistants. I had performed the original Cesarean section and he was in charge of her for the second delivery.

Dr. Findlay's paper is of unusual importance, especially because the operation of Cesarean section is being performed throughout the country, without well-defined indications, by many surgeons.

I think we should be very careful about being dogmatic as to the indications of Cesarean section. For instance, let us take a primipara—a young woman with a transverse presentation, or occipito-posterior position that fails to rotate, and for other conditions for which the operation is being done. I think it is carrying it a great deal too far, for the reason that these patients have to be under the control of surgeons in subsequent labors and must be in hospitals, because they must be guarded against the possibility of rupture. This is particularly impor-

tant in young women who give birth for the first time, for they may not be able to be near competent surgeons, or hospitals, at subsequent confinements, and we never appreciate just what it may mean to these women until we find them pregnant again.

As to the condition of the wounds afterward, I believe if you are to decide whether a woman is to have a Cesarean section in subsequent pregnancies, we should be governed to a great extent by the postoperative history of the case. In these two cases referred to both women ran a temperature after the Cesarean section, and both showed some trouble with the wound. Both showed a septic condition of the wound and one of them had a slight temperature for two weeks.

If a woman has had a complicated record and her history denotes that she had even a moderate degree of infection and involution was retarded, I think we should recommend Cesarean section in subsequent pregnancies.

I have records of four women who have been delivered since I performed Cesarean section on them and they have had no complications such as referred to in Dr. Findlay's paper. Two of them required the use of forceps, however.

I do not believe that it is time to say that *once a Cesarean section always a Cesarean section*. This would be too dogmatic and would often be disastrous.

Any operation in obstetrics that causes a mortality of from 1 to 10 per cent. should not be undertaken lightly. We must never forget that these are obstetric operations and unless the indications are absolute, I believe it would be safe to give the majority of them a test of labor. These indications could also be varied according to the age of the patient or the number of children she has borne. I think we should emphasize the fact that we do not insist that *once a Cesarean section always a Cesarean section.*

Dr. Palmer Findley (closing).—In answer to Dr. Chipman, I would say about 25 per cent. of the ruptures occur in toxemic cases; we all know how readily these patients take on infection.

As to the argument presented by Dr. Green in favor of a thickened uterine musculature, I recall to mind a case in which Professor Franz had a rupture. The following day at the clinic he said henceforth he would change his ideas in two particulars: First, he would do Cesarean section on every woman who had a previous Cesarean section scar; second, he would make high incisions where the musculature was the thickest.

I want to emphasize further what Dr. Miller has said in closing, namely, if there is any one thing that a study of these cases shows, it is that we should look with grave concern on these cases that run a fever course. When we are to assume the responsibility of conducting a pregnant woman up to and through labor who has once had a Cesarean section, we should become familiar with the history of the convalescence in the previous Cesarean section, because over 75 per cent. of the ruptures have shown that in the healing of the initial Cesarean section wound fever has occurred.

THE CONSTITUTIONAL FACTOR IN GYNECOLOGY AND OBSTETRICS

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Since Marion Sims made practicable an operation for the cure of vesicovaginal fistulæ, gynecology has, more and more, developed as a surgical specialty; and while gynecologists have elucidated the morbid anatomy of their specialty, their attention has been chiefly fixed upon the perfecting both of the details of aseptic surgery, and of the technic of the various particular operations which have been originated for either the relief or the cure of the diseases and of the morphological anomalies of women. During the same period, development in obstetrics has also been largely surgical in its character. So much is this true, that gynecology and obstetrics have both tended to become surgical specialties; and the drift in practice, in the United States has been toward the abolition of the specialty of gynecology and the taking over of the duties of the gynecologist by the general surgeon. The writer has never been in sympathy with this tendency in America, but has, on the other hand, felt that the German practice of combining gynecology and obstetrics has much to recommend it, especially from the standpoint of teaching and of theory. He is willing to grant that the practical difficulties which exist in the United States render such a combination of duties relatively impracticable from the financial standpoint, with us; but is not willing to admit

that the general surgeon, who has not served an apprenticeship in an obstetrical hospital, and who has not been trained as a neurologist—and especially, who has not been trained as a psychic analyst and diagnostician—is capable of making discriminating diagnoses in the department of gynecology, and, as a consequence, is not capable of properly discriminating between conditions requiring an operation for their cure, and those which are merely incidental to constitutional manifestations, or to morbid symptoms referable to the nervous, glandular, or the hematopoietic systems.

The unfortunate result of this lack of discriminating insight on the part of general surgeons is the performance of a great many unnecessary, and therefore harmful, operations by them, and by general practitioners doing surgery. This lack of training, and of insight into the nature of the diseases of women which it occasions, are the cause of a smaller number of sins of omission. This is largely owing to the lack of critical judgment on the part of surgeons, who, on account of their deficient training, are obliged to do their work by "rule-of-thumb" methods.

The sins of commission have been, for the most part, in the field of the ptoses and of the various forms of arrest of development of the uterus. Because of the hysterical craze to perform nephropexy which followed the appearance of the early papers of Edebohls, and of the writer, in the "nineties," when a large proportion of general surgeons, operating from "a morphological basis," stitched up all kidneys they could feel, there followed a reaction; whereupon all those calling themselves conservative stitched none. This operative craze was almost as widespread as that of "dilatation and curetting" for arrest of development of the uterus—and as baseless. It is true that patients with a hypoplastic constitution, and also those having "long waists," almost invariably have low placed and quite movable kidneys; which status of the kidney, in such constitutions, is

quite normal, and therefore produces no morbid symptoms; nevertheless, in the minority of instances, perhaps 10 per cent., when such individuals make over-drafts upon their nerve force, by doing more than their capacity for work permits, nervous exhaustion, loss of fat, and a more atonic state of the fibrous and other tissues ensues, with increased movability of the kidneys, and, in certain cases, torsion of the kidneys; when, relative, intermittent obstruction of either or both the renal veins and ureter follows, with congestion of the kidney, and, at times, grosser lesions, as a consequence. In such cases nephropexy is indicated, not to cure the general nervous symptoms due to nervous exhaustion in hypoplastic individuals, but to relieve the local morbid condition, due to local causes and conditions. The same state of facts obtains with reference to the other ptoses, both abdominal and pelvic; and this is also true of other conditions which are, like the ptoses, usually due to environmental hypoplasia or arrested development due to faulty environment.

Sins of commission and of omission are not peculiar to either the general surgeon or to the general practitioner. Those of us who have been in the profession long enough to remember the status of practice in the 80's and 90's, will recall that those gynecologists who are euphemistically classed either as enthusiasts or as radicals, have an equal or a greater number of sins of commission to their discredit. This form of enthusiasm and of radicalism is due either to lack of discriminating judgment or else to a poor development of the ethical inhibitory apparatus.

The minds of gynecologists, prior to 1900, were largely taken up with the development of the details, first of antiseptic, and second of aseptic surgery, until the principles and practice of aseptic surgery were thoroughly worked out, including the installation of suitable apparatus for the preliminary sterilization of instruments, dressings, and the

other paraphernalia of operations. The character of the operative technic of that period is best described as meticulous, and the mental concentration involved in performing many operations used up about all of the mental capacity of the gynecologist, so that he had little intellectual energy for the study of pathological problems, and none, or almost none, for the study of the biologic basis not only of gynecology and obstetrics but also of medicine in general. In his student days he heard the professor of anatomy make some reference to comparative anatomy, as explaining some of the more recondite problems of human morphology; also, either in the anatomical or in the obstetrical lectures a superficial knowledge of the more elementary facts of embryology were learned; and certain of these facts were employed in the explanation of anomalies met with in surgical practice. The younger men in the profession have had a course in elementary botany and zoölogy, and have received some training in biological philosophy; which knowledge was seldom a part of the medical training of their elders, in America.

Also, it is a regrettable fact that the Virchow school of pathologists have turned their attention, almost entirely, to the observation and description of detailed phenomena or facts; and, like the founder of the school, have decried attempts to interpret the mass of facts observed, by hypotheses, as had been the custom in the medical profession and in the broader school of natural philosophers, throughout past ages; which is a perversion of the teaching of Bacon as to the application of the experimental method of arriving at truth. Virchow and his followers condemned what they call theorizing, and, at least relatively, those whom they call theorizers—utterly oblivious of the truth enunciated by Confucius that "undigested facts lead to confusion;" in the vernacular, they were "from Missouri," and to be "shown;" *i. e.*, they would believe nothing they could not

either see, taste, smell or feel—thus denying themselves the use of the higher faculties of consciousness, at least such of them as possessed such higher faculties.

Fortunately, all pathologists and physiological chemists were not obsessed by the fallacious portion of the teaching of Virchow and also of his followers; otherwise, little or no progress would have been made in medicine, as to the theoretical interpretation of morbid phenomena since Virchow's orbit appeared above the medical horizon. Such men as Pasteur, Lister, Koch, Metchnikoff, and Ehrlich have followed the methods of the fathers—to digest facts and to extract the truth from them—or to reduce observed phenomena to principles, through their correlation and interpretation.

The unfortunate consequence of this teaching and practice of the Virchow school was the amassing of such an enormous mass of unexplained and largely useless data that no human mind could remember them, and should one accomplish the Herculean task he would inevitably have suffered with mental indigestion from having crammed his memory with such a mass of uninterpreted facts. This state of affairs was well set forth by Adami in the preface to the first edition of his masterly treatise upon human pathology.

The further and even worse consequence of the obsession of the profession—with reference to the importance of this teaching of Virchow—was that the lessons of the ages, from the days of Hypocrates, down, were largely forgotten. The minds of so-called scientific clinicians were so exclusively taken up with speculations upon the nature of the minute morphology of the morbid processes constituting disease, and as to how these would appear if seen under the microscope, that they have largely "forgot to remember" that these reactionary processes are only a small part of the problem set before them for their solution. The doctor's problem has to do with the human being who is sick, prima-

rily, and it has, only secondarily, to do with the patient's sickness. Hypocrates stated that "it is more important for the physician to understand the nature of his patient, than the nature of the patient's disease." In a relative sense, this is just as true today as it was in his time.

Disease is the reaction of an organism to an environment sufficiently unfavorable to produce either local or general discomfort, or other disordered function, or death. The morbid process is the reaction to safety of the organism in general, or *in loco*, against the unfavorable environment, in its effort to get rid of the influence of the pathogenic agency; which analysis shows is some protoplasmic poison introduced into the organism, or which fails of proper elimination when generated within. The type of reaction, in degree, if not in kind, is due to the type of the organism or the constitution. This factor in medicine, which constitutes the major portion of the doctor's problem, when confronted, as a practitioner, with disease, has been almost wholly lost sight of, and has not been taught to medical students, since the profession became obsessed with the teachings of Virchow; and which has resulted in the spread of therapeutic nihilism. It is only in the immediate present that medical works are appearing, which indicate the beginning of a reaction from the fallacious portion of the teaching of Virchow, and a return to the point of view of the fathers in medicine; which in its modern form may be called the biologic or genetic concept of medicine.

Intelligent and careful observation of the character of febrile reactions in the human family, in the past, had enabled the fathers to differentiate between three types of fever: (1) The sthenic type. (2) The asthenic type. (3) The nervous or irritable type. It was upon a recognition of the type of the fever that special therapy was based. These *three types of febrile reaction correspond to the three great groups of human beings, from the biologic standpoint:*

1. Those coming of sound stocks and having a good constitution, or typical individuals—or evolutes.

2. Those coming of stocks constitutionally defective in one, or more, of their organs, or systems of organs, which states were formerly described as diatheses or dyscrasias or hereditary devolutes.

3. Those whose ontogenesis has been arrested by unfavorable environment in the preconceptional, germinal, embryonal, fetal, or postnatal—infantile, puerile, adolescent, or the youthful—periods of ontogenesis. The arrest manifests itself either as an absent part, or as a morphological malformation, in those in whom the protoplasmic poisoning of the developing organism, due to disease in the mother, occurs during the early weeks of pregnancy, when organs and systems of organs, are being laid down; whereas, when this poisoning occurs later in pregnancy, after the systems of organs have been developed, and also when it occurs in postnatal life, its consequences are manifest in a general, instead of a particular, arrest of growth, and in a lessening of the potentiality of the organism to develop full energy. This latter state may likewise be due to poisoning of the ova, and of the spermatoblasts and spermatozoa, prior to conception, during the dual life of a human being in the environment of the ovary, and of the testis, respectively. Those belonging to this group are environmental, hypoplastic devolutes.

4. A mixed, subgroup, having both hereditary and environmental defects—both hereditary and environmental devolutes.

The *sthenic type of fever* is the reaction typical of those having *sound constitutions*, when suffering from a marked local or general infection. The *nervous or irritable type* of fever is that characteristic of *hereditary devolutes*, and more especially of those having an *inherited nervous diathesis*. The *asthenic type of fever* is that characteristic of *environ-*

mental, hypoplastic devolutes, under similar conditions. The *mixed or nondescript forms of fever* characterize the reactions of those belonging to the fourth, mixed, or subgroup of *both hereditary and environmental devolutes.*

The writer had the good fortune to begin the study of medicine prior to the obsession of the profession by the fallacious portion of the teachings of Virchow, when the wisdom of the fathers of medicine was still taught to medical students. It was of great interest to him to realize the insight of the older clinicians in their classification of "temperaments," and of constitutional reactions to infection, when, after working upon the subject from 1886 until 1908, he realized the nature of environmental constitutional hypoplasia, and the relations of bad environment in ontogenesis, and of heredity, to the production of the two great types of devolving human beings, as set forth in his papers, entitled: "Hereditary Hypoplasia in Man, Due to Degeneracy," (*Tr. Southern Surg. and Gynec. Assn.*, December 16, 1908; *Jour. Am. Med. Assn.*, February 13, 1909, lii, 552–555; *Tr. Southern Surg. and Gynec. Assn.*, Philadelphia, 1909, xxi, 462–475); and "The Law of Degeneracy in its Relation to Medicine," (*New York Med. Jour.*, 1910, xcii, 1261–1266; *Tr. Coll. Phys.*, Philadelphia, 1910).

When these papers appeared they attracted but little discussion, and most of that was unfavorable. This fact was, at first, difficult of comprehension; but upon reflection its explanation was seen to be, in part, that, more especially, the paper on Hypoplasia was poorly written, and, in part, that doctors in general know little of biology, and care less. They have been satisfied to follow blindly the lead of Virchow, who, according to Haeckel, became blind himself, quite early in his career—became a reactionary. Those who had received a biologic training had been trained in the school of Weismann, whereas these papers were written in accordance with the views of evolution of Lamarck,

Darwin, Haeckel and the paleontologists. Hence, among those having had zoölogical training, they encountered prejudices arising out of the controversies between the neo-Darwinians and the Weismannian group of zoölogists. For these reasons the work, when presented, was stillborn.

It became evident that it would be necessary to study the biological relations of the human problem which had been worked out, in the light of the teachings of Weismann and of Mendel, which study occupied nearly four years, when it became feasible to restate the nature of environmental, congenital, hypoplasia discriminatingly, and to point out how that, although congenital, it is not hereditary, but is due to poisoning of the ova (or the spermatoblasts) prior to conception or to poisoning of the impregnated ovum during various stages of embryonic development; and also that constitutional hypoplasia or arrest of development can arise at any time during postnatal life from bad environment. In this way a sharp distinction can be drawn between defective constitutions of *strictly hereditary origin* and those having a *strictly environmental causation*. But the latter may become hereditary in the future generations, or descendants from such parentage, *i.e.*, an individual having arisen from an ovum poisoned in the ovary of the mother, or from a spermatozoön poisoned in the testis of the father, will not be able to produce typical offspring. It was also shown that a large mixed or subgroup exists, exhibiting both morphological and functional defects, some of hereditary and some of environmental origin. It was at the point of "Affection of the Ovum" (Weismann) that the two great groups of devolutes were brought in due relation the one to the other; and, thus, the difficulty arising from the assertion of the Weismann school as to the impossibility of "inheriting acquired characters" was avoided.

It was learned during this time, through the study of antenatal pathology in the human and the study of experi-

mental teratology, that both clinical, pathological, and experimental laboratory evidence is available to demonstrate the correctness of the concept of environmental constitutional hypoplasis or environmental degeneracy in accordance with the strictest requirements of the Virchow school. As Professors Mall and Stockard put it: "All terata, not dying *in utero*, are born alive, and those that live to mature years continue to be terata." These manifest every degree of defect, from a mere incapacity to develop full constitutional energy—*asthenia universalis congenita* or constitutional inferiority or the broader concept of infantilism—as one extreme to gross monsters as the other extreme; with special deformities, such as one-eyed terata, spina bifida, cleft palate, hare-lip, club-foot, infantile vagina, uterus, etc.; and also the greater degrees of asthenia and varying special defects of organs and systems of organs, as diathetic types of environmental defects, between the two extremes already mentioned.

Experimental teratology has now reached the degree of development in its principles and methods that it is possible to produce 90 per cent. of certain forms of terata to order by means of the poisoning of fish eggs, upon different days in their development, by special poisons applied in prescribed strength. The orderly presentation of these facts, and their interpretation, is now engaging the writer.

The application of these principles to gynecology and obstetrics, in explaining the nature of the relation of the particular type of constitution of a patient to disease is apparent.

The diseases and morbid states which constitute gynecology fall into a few groups:

1. Infections: (*a*) of the mucous surfaces of the genito-urinary tract; (*b*) of the peritoneum; and of the tissues, cellular, glandular, and muscular, contiguous to both.

2. Malpositions, and more especially ptoses, of the pelvic and abdominal viscera.

3. Tumors: (*a*) benign and (*b*) malignant.

4. Lacerations—almost always due to traumatism in childbirth.

5. Hypoplastic states of organs or systems of organs arrested in their development, a few from hereditary causes and most of them from environmental causes.

6. Functional psychic and somatic disorders, due to maladjustments of sexual life.

The above grouping constitutes the whole of gynecology in principle.

Most of the above morbid states are atypical, morphological phenomena; *they are not morbid entities or diseases, but are merely phenomena or episodes in the ontogeny of a constitutionally hypoplastic individual*, whose development has been, relatively, arrested. The morphological facts in connection therewith include a persistence of fetal, infantile, and puerile positions and conformations of the organs concerned: such as an infantile or adolescent uterus, ovaries and Fallopian tubes, the pelvic and the low-placed kidney, infantile, puerile, and adolescent forms and positions of the gut; and also puerile or childish or adolescent morphological forms of the entire trunk, including, more especially, the chest and abdomen, which characterize the hypoplastic constitution. Also defective, because arrested, nervous and vascular, supply to the various viscera, and also a defective cerebral autonomic or sympathetic and spinal nervous development, and, likewise, capacity for function.

A careful and discriminating analysis of the types of disease and of morbid states which constitute the department of medicine called gynecology will show either that the constitutional element is the dominant factor in these conditions or else that it enters very largely into them.

It is true that when environment is sufficiently unfavorable, evolutes or typical human beings—or those coming of sound stock and having good constitutions—will become

diseased. The subject of immunity, its essential nature, and the principles and the processes which apply to and govern its manifestations are, in detail, as yet, imperfectly understood. The view of the fathers of medicine that "vital resistance" is possessed in greater, or lesser, degree by different individuals remains true. It is also true that the same individual resists a certain form of infection at one time and becomes infected by the germ at another time. In other words, the degree of an individual's resistance varies from time to time in accordance with his health level, or energy potential; or, in other words, when an individual is "run down" or becomes relatively devitalized, or has his "vital resistance lowered" either by unfavorable environment external to himself or by faulty habits of living, he is more subject to the incidence of infection.

Essentially, the additions to the knowledge of the fathers which have been made by modern investigators are the teachings of Metchnikoff concerning the phagocytic function of the white blood cells or leukocytes, and the teachings of Ehrlich and Wright concerning the formation of immune bodies in the blood plasma—or antibodies, which by chemical union with certain of the molecules of the invading germs devitalize them, so that the white blood cells can destroy them by phagocytosis; or they form antibodies in the plasma, or lymph, which will agglutinate, or dissolve, the invading germ, or foreign body, and thus rid the invaded organism of it.

There has much been written having a new terminology, and therefore sounding recondite and even mysterious to the uninitiated, which, when translated into familiar forms of speech, means exactly what the fathers taught. When Virchow and his school brought forward the cellular theory of disease, humeral pathology was called antiquated and unscientific. Modern serology and immunology have brought the profession back to the view-point of the fathers, as to the important functions of the blood plasma and lymph in

the self-limitation of disease; or, otherwise, as to the nature of the defensive or conservative reaction of the organism in ridding itself of poisons; which reactions constitute pathology.

Humanity exists in three series or groups, with a mixed series or subgroup, and as each human being has his own health level or state of vital resistance, it follows that the percentage degree of the incidence of infection depends largely upon the constitutional factor in an individual subjected to the influence of a pathogenic germ, and the possibility of infection, and in part upon the virulence or vitality of the pathogenic germ. This percentage degree, as has been seen fluctuates in particular individuals, from time to time. In general the vital resistance of evolutes is greater than that of hereditary devolutes, and this is greater than that of environmental devolutes, and, even more, that of the mixed group, devolved from both sets of causes. These are the constitutional factors entering into the nature of infection and immunity in gynecology; and, likewise, all prognoses as to recovery, in particular individuals.

The constitutional factor entering into the problem of malpositions of organs and groups of organs, both pelvic and abdominal, is two-fold. All of the malpositions due to arrest of development and to the persistance of the anatomical forms and relations of periods junior to that of the adult are clearly constitutional in their nature. In the past such malpositions have usually been classed as congenital, although this is in large part erroneous.

Truly acquired malpositions of organs are due either to constitutional weakness—nervous exhaustion, constitutional weakness due to disease, malnutrition, acquired atonicity of the ligamentous supports and of the cellular tissues about organs, and to the absorption of fat from the cellular tissues; or else they are due to injuries producing direct lack of support, such as lacerations of the pelvic floor, or to diseases, or accidents, bringing about continued congestion with

increase of weight of the organ involved, or they are due to increased pressure from adjacent organs or viscera, or to maladjustments of "lines of internal pressure," due to alterations in the configuration of the trunk, producing these maladjustments within the abdomen and pelvis.

Except some of the accidents causing traumatism and lacerations, *all of these conditions have a constitutional origin*; which involves the conclusion that *their scientific treatment must be constitutional in character*—the removal of the cause, regulated rest and exercise, and the improvement of nutrition, through the employment of regulated diet (even though local measures may also be advisable, helpful, or essential) in order to effect a cure and to maintain the subsequent health of the patient.

The essential nature of tumors, their ultimate and their proximate or exciting causes, there is every reason to believe, is a combination of the presence of, relatively, embryonal cells, or cell rests, in the tissues of organs, or in the tissues in general, which under the usual conditions of health remain quiescent; but which under excitation of either a physical or a chemical nature take on growth, and, being relatively embryonal or not somatized, tend to produce tissues or structures imperfectly resembling the tissues which they would have formed had their somatization not been prevented during embryonal or fetal life. As the exciting physical or chemical cause differs in kind from vital or growth force, and as the cell or cells are themselves atypical from arrest, it is natural that the tissue formed by the multiplication of the arrested cell or cells should be aberrant or merely resemble, and not be identical with, the particular type of tissue or structure.

The writer has long been convinced that carcinoma and sarcoma are merely manifestations of marked degrees of arrest or degeneracy, either general or particular, or both. The whole weight of evidence, clinical and pathological,

in the human and in animals, together with the failure of the investigators in this department to find an adequate explanation, or cause, along the lines they have followed, strongly supports this view. The existence of "cancer areas" or "cancer belts," commonly in "shut-in" or isolated communities, whose original settlers were largely of unsound stocks, and the steady increase in the incidence of cancer, *pari passu* with the increase in the percentage of both hereditary and, more especially, environmental degeneration, in relation to the maleficent influence of urbanization (with its type of living, especially for the poor, so little in accord with the habits and conditions under which evolving man has lived in the past), is strongly corroborative of this view. It is further supported by such observations as are available concerning the incidence of cancer, including sarcoma, in wild animals, when their environment has been so altered as to be inimicable to their welfare. The facts as to the percentage incidence of malignant tumors in domesticated animals, and in wild animals kept in menageries and zoölogical gardens, in comparison with wild animals living in their natural habitat, is equally corroborative. The reports of pathologists attached to zoölogical gardens, and the facts of comparative morbid anatomy as they are set forth in such works, are available to students of the subject. The high ratio of sarcoma among hares which are "preserved" in Europe, when permitted to increase beyond a certain number to the acre, and the disappearance of sarcoma when the number is kept within due limits (and also the facts as to laboratory rat, and mouse cancer) lend support to the same view. On the contrary, it is maintained that cancer is very rarely found in wild animals living in their natural habitat. The same contrasting set of facts is true of aborigines when living a barbaric or savage life, and after becoming degenerate from encountering the evils of civilized conditions. For example, cancer was practically unknown among the negroes

shortly after being brought from Africa, whereas today it is as common among them as it is among Caucasians.

Much more evidence of a similar kind is available, all of which, while not demonstrating, from the stand-point of the laboratory, the origin of cancer in degeneracy or arrest of development of an individual cell or cells when embryonal, and their subsequent stimulation or irritation into atypical growth in the adult, by either physical or chemical agencies, makes such a hypothesis much more than probable.

In discussing this question with Professor Stockard, he stated that the facts of experimental teratology not only lend support to the above hypothesis concerning the origin of cancer, but also equally explain the origin of benign tumors. The question as to whether arrested embryonal cells, when irritated into growth and cell division, form a malignant or a benign tumor, depending upon the degree of their somatization when arrested (or the absence of any somatization), together with the nature of the protoplasmic poison which irritates or stimulates them into growth and multiplication of cells, and also the intensity of the poison, due to the quantitative dose of the particular poison—whether chemical—as circulating toxins, or physical—as the *x*-ray, radium, heat—as in certain lip cancers from smoking, or from traumatism—more especially when a long-continued irritation is kept up. This view of the origin of tumors is a combination of the theory of Cohnheim, and the clinical evidence, human, and from comparative medicine, together with the facts of experimental teratology.

The application of the foregoing principles to obstetrics is that they constitute the genetic explanation of certain obstetrical problems: (1) sterility, relative and absolute. (2) Toxic states, arising during pregnancy. (3) Atonicity of the uterine muscle and lack of power on the part of the woman in labor to deliver herself: partly from arrest of development of the uterus, and partly from imperfect inner-

vation, due to arrest of development of the nervous system, with imperfect capacity for functioning. (4) Lacerations in childbirth. (5) Abortions.

1. Absolute sterility in women is due to the absence of the ovaries or Fallopian tubes or uterus, or a combination of these; or it may be due to the absence of or the obstruction of the vagina or to the imperforate condition of the hymen. Relative sterility is due to imperfections from arrest of development of one or more of the structures essential to impregnation; or it may be due, in a few cases, to sexual incompatability between the mates—the nature of which is not understood, although the fact is unquestionable; and, finally, it may be due to obstructions, or altered secretions, due to infection. In this sophisticated day, relative sterility is largely volitional; which volition arises either from ignorance of the whole truth, or, more usually, from selfishness, which is commonly moral degeneration.

2. Toxic states are due either to ingestion of an undue amount of alimentary substances, with consequent faulty digestion and defective anabolism, or, and more usually, to defective glandular organs of digestion, assimilation, and excretion, together with defective ductless glands, whose harmones activate and largely regulate the chemical processes of metabolism. It is natural that toxic states should arise more frequently in pregnant women than in the non-pregnant; because the pregnant woman must perform most of the processes of metabolism for two beings, instead of for one, herself. As a consequence, those suffering from hereditary diatheses involving the organs of digestion and excretion—anabolism and catabolism—or those suffering from arrest of development from faulty environment or environmental hypoplasia, are more subject to the incidence of toxic states than is true of evolutes or typical women. The morbid states, more particularly referred to, are clinically classified as vomiting in pregnancy and eclampsia.

3. Hereditary devolutes having a nervous diathesis have a well-developed uterine musculature, and as a consequence have sufficient driving power to deliver themselves in labor. However, their nervous systems are atypical—hypersensitive, and, relatively, explosive in functioning. As a consequence, such women suffer inordinately in labor, and tend to become exhausted from misdirected application of their energies, and from the morbidity of the excess of their sufferings from the pangs of labor. As a result, they require the assistance of the obstetrician to effect delivery because of exhaustion more frequently than is true of typical women.

4. Environmental hypoplastic devolutes are relatively sterile from the relative infantile or adolescent type of their sexual organs. The musculature of the uterus, relatively, is imperfectly developed and the innervation of the uterus is likewise imperfect. Also their general reserve store of potential nervous energy is small. As a consequence, labor in this group of women tends to be powerless. The puerpera tends to become exhausted, and more frequently requires the assistance of an obstetrician to terminate labor than is true of any other class of women. Likewise as the anatomical parts involved in parturition are imperfectly developed they tend to function poorly—whether this be the generating of energy by the upper portion of the uterus or the passive relaxation to promote dilatation of the cervix uteri and of the vagina and of the muscles of the pelvic floor. Innervation and the correlation of nervous functions are imperfect.

5. Lacerations in childbirth are due either to imperfection in development of the structures involved or to disproportion between the passage and the passenger, which may be essential or may be due to failure in the mechanism of labor itself. It is natural that a poorly developed cervix uteri should fail to relax and be stretched sufficiently to permit the egress of the fetus without laceration in the same percentage of cases that is true of typical women. This same state of facts

applies to the dilatation of the small imperfectly formed vagina and pelvic floor of the environmental hypoplastic devolute as compared with typical women.

6. Abortions are due either to disease of the endometrium, to toxic states of the mother or of the father or to criminal interference with pregnancy. The constitutional factor is a large one in each of these sets of causes of abortion; which is so apparent as not to require amplification.

The neuroses and psychoses of genital origin are both obstetrical and gynecological in their nature. The neurologist and the psychiatrist will each claim these functional nervous troubles as belonging to his particular specialty, but such neuroses and psychoses as arise from the maladjustments of sexual life properly belong in the gynecological and obstetrical departments of medicine.

It is only by the study of woman as a functioning animal, in the sexual sense, and by discriminating observations and analysis of the functioning of her sympathetic and cerebrospinal nervous systems in relation to the sexual life, from adolescence onward, in its relations to the somatic, the mental, and to the spiritual or emotional life, and to the expression of each in function, that an adequate understanding of the nature of woman and also of her nervous disorders, both somatic and psychic, can be attained. This is one of the chief grounds for the existence of the specialty of gynecology and obstetrics, and it is in the study of the psychic functions of woman, and their influence, and more especially of the influence of emotional states upon the health of women and in the causation of functional sexual disturbances that the general surgeon and the average family doctor fail in comprehension and insight as to whether particular symptoms have a local morphological basis or, on the other hand, are caused by morbid emotional states acting through the sympathetic nervous system and through the ductless glands. It is in just this large group of morbid conditions that their

lack of discrimination in diagnosis is most manifest and results in the numerous sins of commission and the lesser number of omission which they inflict upon their women patients.

The following conclusions are submitted:

I. The theory of environmental constitutional hypoplasia or arrested development from unfavorable environment, operating at any period from the preconceptional state of dual life in the ovary and testis, to that of the youthful period in ontogeny, which was presented to the profession as a medical hypothesis in 1908, and which the writer believed to be proved upon human clinical and pathological evidence, is now shown to be equally supported by the clinical and the pathological facts of antenatal pathology and by the facts of comparative pathology, and to be demonstrated by the facts of experimental teratology.

II. The wisdom of the fathers of medicine, as expressed in their discriminating analysis of the facts of the hereditary nature of the diatheses or dyscrasias, together with the theory of environmental hypoplasia, constituted the Law of Devolution in its relations to medicine.

III. In order to obtain a comprehensive understanding of the practice of medicine, it is necessary to reject such of the teachings of Virchow and of his followers as are fallacious, and to combine the clinical wisdom of the fathers of medicine, from Hypocrates down, with the known facts of experimental medicine and their correct interpretation, and thus to arrive at the true point of view from which to study, and to deal with, the clinical problems which are the concern of practitioners of medicine and of each of its specialties.

IV. The constitutional factor in gynecology and obstetrics, as is equally true of the other departments of medicine, is the chief element in the clinical problems which confront the practitioner in dealing with disease, and with atypical organs and tissues and their functions, because it is the

factor which determines the nature of the reaction of the organism to a pathogenic environment or disease, or it constitutes the sole factor in the atypical morphology and function in the patient.

V. The recognition, comprehension, and employment of the foregoing principles will greatly enlarge the powers of the practitioner of medicine in diagnosis, prognosis, and in therapy; in which it will enable him to avoid many common, if not habitual, errors, and, positively, to substitute general nutritional, and developmental measures for the local measures currently employed, and, thus, to effect the cure, instead of the amelioration, of his patients' condition, when due to environmental arrest. Further, it will enable him to give scientifically based advice as to methods of living, when the biologic type of the patient is recognized; to promote the development of environmentally arrested patients, and to enable them to maintain their health, by living within their particular potential or capacity to produce energy, instead of attempting to live as is physiological for typical individuals, but which will cause disease in the arrested—or hereditary and environmental devolutes.

DISCUSSION

Dr. E. Bosworth McCurdy.—It is now some seven or eight years since I came to know Dr. Noble otherwise than as one of our foremost gynecologists. To indulge in a moment's retrospection; somewhat previous to that time I had become interested in the correction of speech defects in children. I was not satisfied, however, with what medical and lay literature had to offer, as it dealt with manifestations, symptoms, and more or less mechanical and routine methods of treatment rather than with basic causes and their correction. It did not take me long to realize that defective speech is but a manifesta-

tion of an underlying constitutional anomaly. Again, I sought assistance from every possible source but with little result. A flicker of light here and there from the writings of medical men, a glimmer, perhaps, from the psychologists, biologists, and sociologists, but nothing sufficiently illuminating to enable me to view the problem with the proper degree of satisfaction. While in this quandary I happened to see Dr. Noble's article, "Hereditary Hypoplasia in Man, Due to Degeneracy" to which he has referred. I at once realized that I had at last found that for which I had so diligently searched, and that constitutional hypoplasia in its varying degrees is the underlying cause, not only of defects of speech, but also of practically all other conditions found in backward, nervous and delicate children. Since that time my interest and line of practice have been not so much the treatment of defects of speech, but the treatment of hypoplasia in children whether its manifestation lies in defective speech or in other variations of mental and physical development. This introduction will, I trust, serve to show the reason for my interest in Dr. Noble's theories and conclusions, my unqualified agreement with them, and, also, my appreciation of the immense assistance they have rendered to me in my special line of work, now dignified by the term pedology.

Dr. Noble in his summary gives as one probable measure for the eradication of degeneracy the application of euthenics. Euthenics, as you may know, is the science and art of improving the human race by securing the best external influences and environmental conditions for the physical, mental, and moral development of the individual, and for the maintenance of his health and vigor. I believe it was Oliver Wendell Holmes who said that the education of the individual should begin with the grandparents. This is true not only of education, a phase of euthenics, but of euthenics as a whole. Dr Noble mentioned "the lessening of the potentiality of the organism to develop full energy" "due to poisoning of the ova, and of the spermatoblasts and spermatozoa prior to conception, during the dual life of a human being in the environment of the ovary, and testis respectively." Such poisoning may also be prevented by subjecting the more or less remote progenitors to proper environmental influences of hygiene, including exercise, nutrition, elimination and freedom from infection. The various health cults are, more or less in the dark, groping toward this

end. It is only when health and its preservation shall become a fetish that we will begin the solution of the problem of degeneracy and, through it, of disease. The present generation of grandparents and parents is beyond our control so far as prophylaxis is concerned. Not so, however, with the grandparents and parents of future generations.

The regulation of environmental influences, preconceptional, postconceptional, and postpartum will not only eliminate environmental hypoplastic devolution but it is reasonable to suppose that it will eventually, if continued over many generations, materially affect hereditary devolution as well, especially when aided by the segregation of those irremediably hypoplastic.

My time allowance does not permit even mention of all the social agencies capable of utilization in the solution of this problem. The present day reaction from the herding of dependent children in institutions and asylums is an important factor in gaining for the child the individualization so necessary for supplying his personal needs. The juvenile courts, playgrounds, recreation centers, home-finding agencies, fresh-air farms, etc., are all important and valuable measures.

It is only through a great public awakening to the fact that every child, rich or poor, has an inherent right to that individual care which will develop his potentialities to their highest point that we can hope to make material progress. This awakening must come through the physician. It is he alone who is capable of understanding the complex make-up of the child and the significance of apparent deviations from the normal. It should be within his province to direct the detail of those environmental influences which make or mar the future; this with normal children, as a preventative of hypoplasia, and, with hypoplastic children, that the tendency to further degeneracy may not only be arrested but that regeneration may be encouraged.

Three years spent in conducting a sanatorium-school, a laboratory for the study of hypoplastic conditions in children with the environment absolutely under control, has proved to me that favorable results may be attained by intensive cultivation of the correlative forces of growth inherent in every individual, however, hypoplastic he may be. Proper diet, exercise, fresh air, and other hygienic influences aided by massage, hydrotherapy, heliotherapy, passive and active gymnastics, proper discipline, systematic cultivation of the various faculties,

functions, and senses, through educational measures with last, but not least, rational medical treatment have indicated the results that may be expected in the future.

I am loth to leave this subject without mention of organotherapy. Dr. Noble has mentioned that irregularities of the ductless glandular system are of great importance in the etiology of hypoplasia. The implication regarding the treatment is obvious. I believe that we have in organotherapy a most powerful aid. Even when it is impossible, as often happens, to implicate any particular part of the ductless glandular system as in myxedema, pituitary infantilism, etc., a judicious use of the various glandular substances will be found of considerable value in stimulating the forces of growth and of metabolism and nutrition. So firm is my faith in the pluriglandular treatment of hypoplastic children without definite pathology, that I am in the habit of administering to such children almost as a routine measure a prepartion of the various glands in combination.

Dr. Richard R. Smith.—Dr. Noble gave me a copy of his paper a few days ago to read, and I have done so with a good deal of interest. I have had a great many discussions with Dr. Noble in regard to some of these points. I have not been able to agree with him in all of them, but that is due largely I think to my lack of knowledge of certain fundamental principles with which he is more familiar. Dr. Noble's paper constitutes a strong plea for the study of biology by our coming generation of medical men. He has presented one of a number of similar pleas which are being made by intelligent surgeons all over this country. Dr. Dickinson has made a similar plea for the study of physiology. If we are going to deal with a medical subject intelligently, we should know something of fundamental principles of biology and physiology. I would add to them a study of psychology, because I think we shall never understand the neuroses until we as gynecologists are more fully informed in the principles of psychology. The thing that Dr. Noble and I have discussed principally in reference to his subject is the question of ptosis.

A number of years ago I went into this subject quite thoroughly. I examined a large number of women, and it became apparent in that study that a large percentage of the women with ptoses belonged to a certain frail, slender type of

individual (habitus enteroptoticus, asthenicus or neurasthenicus) with which we are all familiar. It became also apparent that the serious thing about these women was not the ptoses themselves, but the constitutional defects which lie behind them. The fact that a woman has a floating kidney or a prolapsed stomach or colon, has been I think well demonstrated to be far less important than the fact that she lacks vigor, is limited in her capacity to take her place in the world and do the work that is required of her, look after her home, bear and care for children, and resist the various strains to which women are subjected, but which normal women can meet.

The matter of age is of prime importance in prevention. If we will go back into their childhood, we will find that all of these women were frail during the period of their development, and that the condition is very largely congenital. Another fact stands out clearly, and that is that this congenital tendency may be largely influenced for the better in childhood, and it is to that period of life that we must direct our energies if we wish to accomplish very much with this type of women.

It seems to me that the present movement in our schools to meet the needs of special classes of physically or mentally defective children—the outdoor schools more especially—is a thing which will eventually lead to a better state of affairs, and will prevent partially at least the conditions to which Dr. Noble has referred, and which seem so hopeless in adult life.

TISSUE TONE AS AN INDEX OF VITAL RESISTANCE, WITH SPECIAL REFERENCE TO PROLAPSE OF THE UTERUS

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One of the hardships of surgical work is the difficulty in making an accurate estimate of the ability of the patient to withstand certain operative procedures necessary to restore health. Improved technic and better judgment as to the time when to operate have reduced the risk very materially, so that deaths from the ordinary postoperative complications, such as peritonitis and hemorrhage, seldom occur.

The future problems for the surgeon, so far as operative mortality is concerned, deal largely with better knowledge of the horse-power of his patient. When there is no relief for the patient except that afforded by surgical measures, notwithstanding an element of risk, the responsibility must occasionally be accepted and the true surgeon will accept the risk without thought of his mortality. In a handicapped patient where the danger of operation is largely a question of the ability of the patient to withstand the shock and fatigue incident to operation, and the strain of postoperative distress, the most careful study is necessary to determine whether a given operative procedure may be undertaken with safety. Independent of the usual contra-indications, such as damaged kidneys, lungs, and marked cardiac disease, there is a condition which is characterized by poor tone

throughout the entire muscular system, including the heart, which is most difficult to measure. The underlying cause may be obscure, and unless its presence is appreciated an occasional fatality will be registered that should be avoided. The heart sounds may appear normal, but if studied carefully the heart shows marked absence of muscular tone and seems flabby. When further examination reveals this same condition throughout the body it is of great prognostic importance. It is unfortunate that the proper estimate of strength under these conditions must still remain one of personal equation and that no instrument of precision has yet been devised whereby the real horse-power of the circulatory system may be revealed. After years of stress, due in part to some definite pathological condition or to other changes which may be secondary or perhaps independent of the former condition, the patient is presented to the surgeon as the court of last resort. It is in this type that the utmost caution must be exercised and where the keenest judgment is necessary to calculate the amount of strain that the patient already handicapped may endure. The underlying condition may best be described as one of chronic fatigue and the tissue changes which occur may be directly due to long-continued absorption of toxins, starvation, or to changes in the sympathetic nervous system which remain obscure and are not understood. The excursion undertaken by the patient when surgery is employed is best described by comparing it with a Marathon race. In major operations the patient is subjected to almost the same test that comes to the athlete under severe strain.

With any of the forms of inhalation anesthesia the heart is driven at a rate much higher than normal. It is obvious that after a certain time has elapsed there comes a period of exhaustion in the circulatory apparatus just as it does in all muscular tissue after severe tests. The use of local anesthesia is a beautiful demonstration of what part the anesthetic

takes in aggraviting or increasing the amount of muscle fatigue incident to any operative procedure. The problem for the surgeon to decide then is how far and with what speed can a given heart be driven so that the patient may remain within the limits of safety. The study of our cases show that it is not only failure of the cardiac muscle to withstand the stress, but in some instances there is exhaustion of the muscular structure of the stomach and intestines to such a degree that death ensues from what has been termed paralytic ileus. Occasional reports in literature of death from this cause following simple procedures, as, for example, minor operations for the cure of prolapse of the uterus, lead to the belief that this complication is due to this cause rather than to some obscure effect upon the sympathetic nerve centres. So far as the study of the heart is concerned we must keep in mind that it is constructed of the same element as the bloodvessels, and that it is but a differentiation of the muscular envelope every part of which is capable of maintaining a certain pressure. The maintenance of the circulation is not carried out by the heart alone. The bloodvessels constitute an integral functioning factor. It is difficult to determine how much weakening of either factor may lead to dilatation, but it is important that the intimate relationship be kept in mind. The variations which may occur are so complex that we should be able to make accurate measurements upon the envelope as a whole, if we are to be certain of its efficiency. There is absolutely no difference between a weakened biceps and a flabby heart muscle, and both may result from changes in the tissues caused by some obscure toxemia or chronic infection. The object of this discussion is to call attention to the necessity for more accurate estimate of the tissue strength in general, for in our judgment much depends upon a keen appreciation of the amount held in reserve by every patient, more especially the type under consideration. How can this problem be solved? Study of

the patient's history together with careful observation are and will always remain the most reliable aids in forming an opinion as to the probable amount of reserve strength in the given patient. Inquiry should be made for the presence of shortness of breath on exertion, and if advisable the effect of exertion should be noted. Much may be learned by the careful examination of the resistance and consistency of the muscles at rest and in action. A history of any disturbing condition in the function of the thyroid gland always suggests the probability of friable muscular tissue lacking both tone and strength. The same is true in the presence of fibroid tumors and in some cases of intestinal stasis. Every case of chronic infection of the gall-bladder is below par in this respect, and the high mortality following operations upon this organ is largely due to weakness not only of the heart itself but that of the entire muscular system. Accurate observation of the blood-pressure, with particular attention to the pulse-pressure, should be made. In our service this is routine in the examination of all patients. Recently Dr. Cashman, my associate, conceived the idea of making observations upon the effect of exercise on the pulse-pressure in all patients where there is any suspicion of general muscular weakness. The border-line cases studied from this viewpoint are too few to draw conclusions, but our experience leads us to believe that it will be of great assistance.

The following cases are good examples of the apparent value of the pulse-pressure test:

Mrs. C. B., aged fifty-five years. Admitted to St. Francis's Hospital October 20, 1915.

Chief complaint, vaginal bleeding and general weakness.

Family History. Unimportant.

Past History. Aside from some disturbance of the digestive organs at irregular intervals the general health has always been fairly good until the past year. Menstruation began at the age of fifteen years, and was always normal; the meno-

pause occurred at the age of fifty-two years. Has had five children, all of which were deliverd in a normal way. No miscarriages.

Present Illness. For the last year the patient has noticed a slight bloody vaginal discharge which occurred at irregular intervals. Sometimes occurring every day and then disappearing for quite a long period. Is not associated with any pain, but for the last few months patient has grown very nervous; has been greatly depressed and inclined to worry about her condition. Examination reveals a well-nourished woman who, when examined in the dorsal position, presents little evidence of ill health. Is suffering no real discomfort, and has good color. There is nothing unusual to note in the way of special examinations except the absence of good tissue tone, which is made apparent by the flabby condition of the muscles in general and a history of some swelling of the extremities. Vaginal examination shows a marked relaxation of the vaginal wall, due to separation of the muscles of the perineum and fibers of the levator muscle. The cervix is considerably enlarged, containing much scar tissue. There is a small polypous, the size of a pea, about 1 cm. over the external cervical opening. There are a number of other small excrescences polypoid in nature over the surface of the cervical mucosa. This tissue bleeds freely when touched, but there is no marked friability of the mucosa, as one would expect, from the absence of malignant change. The cervix when in standing position protrudes from the vulva, and there is marked relaxation of the uterine ligaments. The uterus is normal in size and freely movable. The adnexa are normal. The tissues are all softened, and a prolapse which has increased perceptibly within a few months has apparently been precipitated by weakening of the muscular tone incident to constitutional change. Examination of the heart as made by Dr. Cashman shows an accelerated rate. The pulse-pressure on reclining is 49, when standing

20. After several trips around the room, 18. Reclining in bed a few minutes later, 49. Impression heart muscle stands strain poorly. A note made by Dr. Heard, November 12, 1915, stethoscopic edema rate, accelerated 90 to 100. No indication of pericardial involvement or valvular disease. Boundaries of heart cannot be determined on account of large mammæ.

Diagnosis. Insufficient myocardium. Electrocardiograph first plate strongly resemble flutter curve but this is not confirmed by subsequent electrocardiograms. Wassermann test was negative and the sulphophenolphthalein test for kidney function showed a total of 73 per cent. at the end of two hours. This patient was kept at rest in bed for a period of two weeks at the end of which time owing to the possibility of the presence of malignancy operation was done under local anesthesia. The cervix was amputated and the posterior vaginal wall repaired. The patient did not complain throughout the operation, and made a good recovery. Examination of the cervix showed no evidence of malignant change. Patient was discharged at the end of twenty-four days. There was great improvement in her general condition. Patient had made a satisfactory recovery.

Mrs. E. S., aged forty years. Admitted to St. Francis's Hospital September 29, 1915.

Chief complaint, prolapse of the uterus and bladder.

Past History. Has always been strong and well until the past two years, except for a period of time after fifth child was born, which was ten years ago. There was some prolapse which lasted for a few months and then disappeared. For the last few months she has been having headache and vertigo and is short of breath on exertion. Has feeling of distress and palpitation over precordium at times. Menstruation began at the age of sixteen years and has been somewhat irregular, but the flow has been normal until the last few months, when it has increased. Has no pain during men-

struation, but since illness began headaches and vertigo are worse during that period. Patient is the mother of seven children, all living and well. The labors have all been difficult. Last baby was born in 1913, and recovery was slow after this delivery. Patient has always worked very hard and taken sole care of the children, doing much of the housework. Patient is a well-nourished woman, having good color and very healthy in appearance. Tissues are soft and the consistency very flabby. Vaginal examination reveals a complete prolapse of the uterus, with large cystocele and rectocele, which condition, according to the patient's history, has become much aggravated within the last few weeks.

Examination note on the heart by Dr. Cashman, September 30, 1915: Apex beat barely felt, sounds heard best in the fifth intercostal space inside of the nipple line. On percussion, heart area is not enlarged. On auscultation there is a low-blowing systolic murmur heard at the apex and over the base of the heart, which is not transmitted to the axilla. Heart sounds are regular but not strong. Systolic blood-pressure, 118; diastolic, 80. Pulse-pressure, 38. After the patient walked up and down the room rapidly the pulse quickened and remained rapid during the examination, with considerable respiratory change in rhythm, becoming more rapid during inspiration. Pulse-pressure after exercise, 8; systolic being 120 and diastolic 112. Heart murmur not increased after exercise; impression weak heart muscle.

Examination October 9, 1915. Patient has been in bed since admission. Systolic blood-pressure, 108; diastolic, 72; pulse-pressure, 36. After standing systolic pressure is 116 and diastolic 94. After exercise systolic pressure is 106 and diastolic 94; pulse-pressure 10.

October 15, 1915. Patient's heart muscle shows very little signs of improvement, and as she is unwilling to remain in bed for a prolonged period of time until we feel satisfied that the muscular tone is sufficient to withstand the ordeal

of an operative procedure, she is allowed to return home. I am informed by her physician that she remained in bed for several weeks at home and is now much improved. Is attending to her usual duties and there is great improvement in the discomfort incident to the prolapse of the uterus.

No test has as yet been suggested which will give an accurate measurement of the functional capacity of the heart. Perhaps the best method, and one which offers the greatest possibilities, is that described by Graüpuer and partly confirmed by the interesting work of Barringer. (*Archives of Internal Medicine*, November, 1915, xvi, No. 5, and March, 1916, xvii, No. 3.) The essential features of this test are the deductions made from the form of the curve of the systolic blood-pressure after measured amounts of work. Barringer states that although he is unable to confirm some of his results, that he believes that the method of making frequent readings of the pulse-rate and systolic pressure after measured amounts of work furnishes the key to this problem of determining the heart's efficiency. These experiments are carried out by the bicycle ergometer and with dumb bells. He concludes that in the pulse-rate and blood-pressure reactions to graduated work we possess a valid test of the heart's functional capacity. If the systolic blood-pressure reaches its greatest heighth not immediately after work, but from 30 to 120 seconds later or if the pressure immediately after work is lower than the original level, that work, whatever its amount, has overtaxed the heart's functional capacity and may be taken as an accurate measure of its efficiency. This article should be read by those interested in this subject, for it may be applied to the determination of cardiac weakness referred to in this paper just as in cardiac insufficiency from valvular disease.

A study of "soldier's heart," or "the irritable heart of soldiers," approaches the subject from another stand-point, and was the basis of a discussion held at a meeting of the

Section of Pharmacology and Therapeutics of the Royal Society of Medicine on January 18 (*British Medical Journal*, January 22, 1916), to which Sir James Mackenzie and his collaborator, Dr. R. McN. Wilson, contributed the opening papers. The disorder attracted much attention during the American Civil War, and was exactly described by Henry Hartshorne in a paper published in the *American Journal of the Medical Sciences* in 1864. In the same year the British Government appointed a committee to inquire into the heart conditions prevailing in the army. It sat for five years, and came to the conclusion that the form of accoutrement then in vogue, by restricting the heart's action, caused its "irritability." One of its recommendations was that the principle of the brace should be adopted, and this was afterward acted upon, but the irritable heart remained. Another theory, initiated by Surgeon Arthur Davy in 1876, has proved equally fallacious. In his opinion "setting up" drill was the cause. It acted, he said, by overexpanding the chest and thus dilating the heart. But, as Dr. Wilson points out, cases are now met with among soldiers who have had little or no drill in circumstances where this cause could be excluded.

The observations of Sir James Mackenzie and Dr. Wilson suggest that the malady should be regarded in an altogether different light. They have examined about 400 soldiers who have been certified and treated as having heart affections. In their opinion, in at least 90 per cent. of these, the heart is not primarily at fault, and the treatment suitable for them is widely different from that appropriate for patients suffering from heart failure. They consider the condition one of general exhaustion, and the circulatory symptoms but evidences of a general state. In the majority of the cases the onset of the exhaustion was found to be connected with an infection; in a few a history of very strenuous life preceding the symptoms was alone obtained. These observers

make a clear distinction between the symptoms arising from infection of the heart and from cardiac failure on the one hand and those of the "poisoned" heart, as they term the "irritable heart" of soldiers, on the other. The principles of the treatment which they recommend are a natural corollary of this conception of its etiology; they are directed to increasing the general health of the body in such a way as to increase the natural resistance to infection, to eliminating toxic influences, and to bracing up the patient bodily and mentally.

A kidney function test should be made previous to every major operative procedure. The value of the *x*-ray in certain instances should not be overlooked. The electrocardiograph is an instrument from which much was expected in the revelation of obscure conditions in the heart muscle. Dr. Heard has been very kind in his endeavor to help us in the elucidation of some of these problems, and the results will be embodied in a later report. I am convinced that it is another important aid, but whether it is of great value in measuring the actual strength of heart muscle has not yet been determined.

We desire to emphasize the importance of another danger signal which may be observed by the gynecologist. A keen appreciation of this danger may be in some instances of great importance. We have been impressed with the frequency with which loss of tissue tone together with a flabby heart muscle is found in prolapse of the uterus in certain individuals. Our records show that in 1000 major gynecological operations there were 15 deaths exclusive of several deaths which occurred in different varieties of infection following delivery. Three of these deaths followed operative procedures for the the relief of prolapse. In every instance we were not unmindful of a certain risk, and operation was undertaken after careful consideration of the margin of safety and the operative procedure adopted, which might give the least amount of stress. This experience together with the necessity of

refusing operation to several patients with prolapse on account of apparent muscular weakness has led to the conclusion that in certain cases of prolapsus uteri serious consideration should be given to the study of the general condition of the patient with especial attention directed to the heart muscle. In the majority of all cases of prolapse of the uterus it occurs because of several different factors. The absence of support from below, increased weight of the uterus, intra-abdominal pressure from above and elongation or stretching of the muscular and ligamentous supports of the uterus include briefly the essential causes. A given case may be due to one or all of the above-mentioned conditions. It is important in every instance to give careful attention to the analysis of the case, and if it should appear that the principal cause is due to relaxation of the muscular and ligamentous supports, careful study should be made of the muscular tone of that individual. This is true particularly when the prolapse develops rather suddenly, the patient seeking advice a few weeks from its onset. Not infrequently the ordinary predisposing causes may have been present for years, that is, absence of the pelvic floor with wide separation of the transversus perinei and levator muscles, with perhaps an enlarged uterus, but suddenly for no well defined reason, the uterus becomes prolapsed to the second or third degree. This means the addition of another factor, namely, sudden weakening of the muscular and ligamentous supports dependent upon some constitutional change in which the tissue weakness is a general one. Careful analysis of this predisposing cause may reveal wide-spread weakness of all tissues, and unless this condition is recognized the resistance of the patient may be greatly overestimated. We have then in the prolapse local evidence of a condition which is wide-spread and an index which suggests most careful study of other organs. Prolapse of a moderate degree is often found when there is loss of tone due to general weakness which

disappears as soon as the individual is restored to normal. This not infrequently occurs in patients who subject themselves to a strict diet in order to reduce their weight. As soon as strength is restored the organ returns to its normal position. Occasionally, patients give a history of recurring attacks of prolapse, the uterus appearing at the vulva accompanied by many annoying discomforts. After a period of rest and general tonic treatment it becomes restored at least partially to its normal position and the local discomforts disappear. Sooner or later, however, the displacement recurs and operative measures become necessary if permanent relief is obtained. In several instances I have assured patients that operation was the only method of relief, but they did not agree, and after being treated by an osteopath or someone skilled in the wonderful science of suggestion they have been temporarily relieved of their symptoms, meanwhile rejoicing in their escape from the surgeon. Much is heard from the surgeon at the present time about his low rate of mortality. We do not wish to minimize the importance of these reports, but is it not time that more frankness be exhibited and careful scrutiny be given to the study of our death? Everyone who devotes himself exclusively to surgery, either general or special, should not be ashamed of his mortality at the present time and there is no reason why every death should not be reported and studied in the minutest detail. For this reason we beg to submit the report of three cases which died after operations rather simple in character for relief of uterine prolapse.

Mrs. C. K., aged forty-seven years, admitted to St. Francis's Hospital June 20, 1910.

Diagnosis. Laceration of the perineum, prolapse of the uterus, and chronic appendicitis. Ten children.

Present History. Present trouble began eighteen years ago after birth of fourth child. Patient is quite stout, weighing 160 pounds. Careful examination did not reveal any

unusual condition except that there seemed to be some considerable loss of muscular tone. Patient had not been feeling very well for several weeks previous to admission. Aside from the condition of some weakness in a general way patient seemed normal. Heart sounds were clear and no apparent enlargement present. Urine negative. Examination did not reveal any apparent contra-indications to operation.

Operation. D. and C. Repair of perineum, suspension of uterus, and appendectomy. Ether anesthesia. Patient's pulse ran an unusually high course throughout the operation, and remained high. That evening at 10 P.M., pulse was running 120 to 130. Patient unusually restless. The next day there was considerable nausea and vomiting; pulse rose to 135. There was an unusual amount of distention which yielded to enemas. Pulse became somewhat irregular. On the fourth day patient's bowels moved three times and always expelled large quantities of gas after the administration of enemas. Temperature, 99°; pulse running from 130 to 140. Patient died on the fifth day. The pulse continued to run very high and the abdominal distention gradually increased. There was no evidence of any obstruction of the bowel or of peritonitis. The death seemed to be due to weakness of muscular structure of the heart and of the intestines as well.

Mrs. L. B., aged forty-eight years, admitted to St. Francis's Hospital November 6, 1914.

Diagnosis. Laceration of the perineum, cystocele, chronic endocervicitis, prolapse of the uterus. This patient, aside from an attack of typhoid fever at the age of twenty-five years, gave a history of perfect health until three months before admission. At this time she first noticed the uterus coming out of the vagina, and since that time has not been feeling well in a general way. Has complained of being tired and unable to withstand fatigue. Has had some short-

ness of breath on exertion. Patient appears in perfect health, well nourished, and color unusually good. Physical examination reveals slight irregularity of the pulse. For this reason she was placed in bed and kept there for a number of days, at the end of which time the pulse seemed perfectly regular, and while the heart sounds seemed somewhat distant they were perfectly clear. On November 14 her condition seemed very good and it was decided that there would be no unusual risk in operation. The operation consisted of the repair of the cervix, cystocele, and rectocele, shortening of the round ligaments, a procedure unaccompanied, as a rule, by any great amount of shock. It was noted at the time of operation that the tissues were unusually soft and friable. Ether anesthesia. Patient was unable to void after operation, and there began on the following day persistent distention of the intestines accompanied by vomiting. Gastric lavage relieved for a few hours as did the use of pituitrin and the repetition of enemas. This condition persisted for three days, when, owing to a possible doubt as to the presence of some mechanical obstruction due to the operation, the abdomen was again opened. No mechanical obstruction was found nor was there any evidence of peritonitis. The intestines were distended throughout and while an enterostomy was done 4 inches from the ileocecal valve the distention continued without relief. The patient died two days later from paralysis of the entire intestinal tract commonly known as paralytic ileus. There seemed no doubt in this patient that the death was due to lack of horse-power and that it was located not only in the cardiovascular system but in the unstriped muscular fibers of the gastro-intestinal tract. A death of this kind is extremely difficult to understand and it might be due to some disturbance of the internal glandular secretions which in some way disturb the sympathetic nervous system. A case of this kind, however, supports the argument advanced

that the prolapse was an important index and was a danger signal which, if properly appreciated, might have prevented a surgical death.

Another case, which is a good object lesson, was that of Mrs. J. W., aged forty-six years, admitted to St. Francis's Hospital, October 13, 1914.

Diagnosis. Prolapse of uterus, with possible malignant change in the cervix. This patient had been having irregular atypical bleeding from the uterus for some time previous to admission, and it was necessary that a careful examination be made of both cervix and the body of the uterus. This patient was very stout, weighing 215 pounds. She gave a history of having considerable nervous trouble for some months. Had varicose veins for thirteen years. Very difficult to make satisfactory examination of her heart on account of large amount of fat covering chest. The right border starts at the midsternal line; sounds at apex clear and no murmurs. Impression gained is that the heart muscle is below par. Blood-pressure, systolic, 110. On account of the possibility of malignancy and the presence of a prolapse of the third degree a vaginal hysterectomy was done under spinal anesthesia. The patient made a good postoperative recovery. There was little shock and no postoperative discomforts. About two weeks after the operation patient began to complain of some shortness of breath and dyspnea when talking. This kept up for several days and gave us considerable apprehension, because we had a keen appreciation of the narrow margin of resistance present. Without any aggravation of these symptoms the patient suddenly died in the night twenty days after operation. The tragic end of this patient is a good example of an occurrence which happens not infrequently after operation. Patients seem to have enough strength to carry them through the operation and are well on to convalescence. Perhaps when allowed to get out of bed for the first time there is a sudden dilatation

or giving way of the cardiac musculature, and death suddenly ensues.

Conclusions. A keen appreciation of this subject will enable one to make a more accurate calculation of how much stress a given patient will stand without fatal results. In elective surgery it will lead to delay in cases where prolonged rest in bed or other suitable measures are necessary to bring the resistance of the patient to a point where operation may be undertaken with the least possible risk. It will compel one to select the form of anesthetic which throws the least amount of work on the heart muscle and the one which lessens shock and postoperative stress, for in many instances it holds the balance of power.

DISCUSSION

Dr. George Gellhorn.—In an indirect way, this paper is perhaps the strongest plea I have yet heard of the advantages of spinal anesthesia. One has to see but two cases of extended abdominal operation for cancer of the uterus, of two and one-half hours each, one operated under ether anesthesia and the other under spinal anesthesia, to realize fully how tremendously the ether anesthesia saps the strength of an individual and lowers the resistance of that patient to a dangerous level. I know that there are cases operated upon under ether anesthesia in which the resistance is not materially lowered, but if you compare large series of ether and spinal anesthesias you will see the difference in convalescence. He who rejects spinal anesthesia on general principles or for sentimental reasons deliberately deprives the patient of a valuable means of getting well by preserving the power of resistance of the organism, and he who rejects it on account of obtaining poor results, had better study the matter for the reason that these results are more likely to be due to his technic than to the anesthetic itself.

PAINLESS LABOR

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The recent general agitation over the question of painless labor has accomplished much good in:

1, stimulating research into newer and even older methods of painless labor; 2, demonstrating to us that the use of some preparation of opium, intelligently administered, is not as dangerous to the unborn child as we have in the past supposed; 3, emphasizing the baneful results of fear, pain, and shock of labor upon the present and subsequent mental and physical condition of the highly civilized neuropathic woman of the day.

Many, possibly the majority, of the upper highly civilized class of women are physically and mentally unfit to suffer an approach to spontaneous labor by reason of their low resistance to the shock of labor. Hence these women have pathological labors—are themselves neuropathic.

Unless guarded from too much suffering by analgesia or anesthesia, or perhaps surgical means, women of this class experience a profound physical and psychical shock in their first confinements, from which some never fully recover, or they readily succumb to some intercurrent condition. Witness the numerous mental and physical wrecks dating from the birth of the first child.

Never before has the need for an artificial painless labor been more urgent.

Shock from pain of labor in the highly civilized neurotic woman must be reckoned with in general childbed mortality.

Painless labor in these women is a life-saving measure.

Moreover, shock produced by the first stage of labor in these patients is a fact, not a theory.

The problem before us is the control of the pain in the first stage, the longest stage, often lasting a day or more. Here lies the foundation of the whole subject of painless labor today.

After the barrier of the cervix is removed and the case passes on into the expulsive stage a much simpler condition presents itself, as in skilful hands, surgical intervention with surgical anesthesia are always in order, the indication presenting itself.

In the majority of primiparous labors, reflex spasm of the soft parts, spastic or functional rigidity, is a cause of unnecessary suffering and delay in the first stage.

For the moment there is no ideal single method of painless labor.

The only absolutely painless labor is one terminated by surgical means with complete anesthesia.

Conditions will always arise, for example in early rupture of the membranes, in which the necessity for painless labor will demand such surgical termination.

The ideal narcotic, analgesic or anesthetic, for painless labor should possess the anoci-association of surgical practice, namely: (1) the blocking of pain, fear, shock, and reflex sympathetic factors; (2) the removal of reflex spasm and its resulting spastic or functional rigidity of the birth canal.

The most satisfactory painless labor method of the moment combines opium and antispasmodics for the first stage, with possibly vapor narcosis toward the end of this stage; vapor analgesia and anesthesia for first and terminal parts of second stage respectively.

The narcosis aimed at should, until the perineal stage, be

analgesic and not anesthetic in character, whether by drugs or vapor—a difficult or impossible object to attain unless one has had considerable experience.

1. *A good physical and mental condition* in pregnancy stands for more stable nerves and more vigorous and persistent expulsive forces in labor. And to go a step further, a carefully supervised and successful first stage means an easy second stage. The influence of Prochownick's diet upon the size of the fetus must not be neglected in this connection.

2. *Sleep* contributes to the success of the early hours of the first stage.

3. *Posture* in the first or second stage does not materially affect the course of labor.

4. *Suggestion and hypnotism* could go no further than the very early hours of the first stage.

5. The same can be said of *mild sedatives, including the bromides.*

6. *Alcohol*, with or without its combination with opium, is a common mode of self-administered painless labor among certain classes.

Amnesia and the elimination of spastic rigidity is produced.

7. *Rectal gas and drug anesthesia.* Savitzky's method for the first stage consists of enemas of antipyrin and laudanum. The use of chloral hydrate in the same manner for spastic rigidity of the cervix is well known. We do not know of any advantage in the colonic absorption of ether method, but there are possibilities in the oil-ether colonic anesthesia if directed by a first-class anesthetist. We are experimenting in this field at the present time and regret that we cannot report upon the method.

8. *The blocking of afferent impulses to the brain by spinal lumbar, nerve, and nerve-root anesthesia and perineal infiltration* secured by cocain, novocain, etc., once promised a solution of the problem of painless labor which has not been kept. With intraspinal injections we have had some experience, but

have abandoned them because of the danger, headaches, vomiting, and interference with uterine contractions. Some have, however, developed a high degree of technic in this direction. The New York State Board of Health recently investigated a maternal death due to this method.

Nerve and nerve-root anesthesia and perineal infiltration call for an elaborate technic, and have not been generally taken up. The recent literature on these subjects is small and unconvincing.

9. *Opium* alone, or combined with scopolamin, chloral, atropia, the bromides, strychnin, caffein, and possibly gas analgesia, is our mainstay for the first stage. It is narcotic and antispasmodic.

Our hesitation to employ opium in labor in the past has been uncalled for, the experience of the last few years demonstrating that opium in its action upon the mother, and particularly the fetus, is harmless, when its administration is limited to the first stage and its action does not lap over to the expulsive stage.

With the two actions, narcotic and antispasmodic in view, even before the recent reintroduction of morphin and scopolamin, we made it almost a routine in primiparous women to give one or more doses of morphin grain one-quarter, with atropin, grain one hundred and a twentieth by needle, and twenty grains of chloral by mouth. Indeed, on one of our hospital services this procedure is practically a routine in primiparous labors. The pain and distress is self-evident, and we take for granted the spastic rigidity, whether found by palpation or not. This means we employ the method in both the so-called higher and lower classes.

The results have been excellent, as we follow up with vapor narcosis in the second stage and later with surgical anesthesia, by chloroform, ether or nitrous oxide-oxygen for the perineal stage. Even huge doses of the bromides will not take the place of chloral hydrate for the foregoing purpose.

In prolonged first stages the combination can be repeated to advantage, and, as far as we have observed, with safety to both mother and fetus, always excepting toxemia cases, in which chloral as well as chloroform is prohibitory.

Usually with one dose we obtain for three hours or more, rest from pain, rest from fright and mental excitement, rest from shock-producing influences, and renewal of labor subsequently with increased resistance and a patient in improved physical and psychical condition to face the expulsive stage.

Whether the combination of morphin, atropin, and chloral has a local action upon the rigid muscle fibers, whether a functional motor paralysis or an anesthesia, does not always appear.

Numerous attempts have been made to combine sedatives and narcotics or give them in sequence. De Aragon, of Havana, has recently reported his experience in obstetric analgesia with a mixture of heroin, scopolamin, atropin, and spartein. Some obstetricians do not use atropin or scopolamin without digitalis or strychnin.

10. "*Obstetric*" *ether and chloroform* are too well known to need comment. Both, in time, lessen the force of the contractions and thereby delay labor. Unlike nitrous oxide vapor, they possess no oxytoxic action. They are the *pain controllers* of the second stage, especially the *perineal stage.*

To the old saying of "morphin for the first stage and chloroform for the second," we must today add nitrous oxide and oxygen for the second.

11. As an intermittent analgesic or anesthetic the *nitrous oxide-oxygen mixture* is well adapted to the second stage. Webster and his associates have done much to make this method of painless labor popular.

In the second stage it does not interfere with uterine contractions as does ether and chloroform, but by arresting pain, prevents shock and exhaustion, and her resistance not being lowered, the patient is the better able to withstand subse-

quent infection or complication. Our experience has been limited entirely to its use in the second stage, and in all the mass of recent literature upon the subject we gather it is of no value in the first stage, or the writers avoid mention of its status in this stage.

In the hands of inexperienced hospital internes our results with this method have been deplorable if not dangerous to the patient. Under the management or supervision of a first-class anesthetist the method works out beautifully. We have experiments with three gas machines and finally settled upon a simple single bag instrument.

We dissent from the announcement that the administration is safe in unskilled hands. It is difficult to reconcile the statement of the recent advocates of nitrous oxide-oxygen analgesia and anesthesia, and the teachings of some of our most expert users of this gas combination. On the one hand we are repeatedly told that the use of nitrous oxide and oxygen for analgesia and anesthesia is a simple matter for one to become proficient in after a few trials.

Again, listen to the statement of perhaps the greatest authority on the use of nitrous oxide and oxygen in dental surgery, James F. Hasbrouck, New York. (*Transactions of the Dental Society of the State of New York*, 1914, p. 164) says:

"I am not prepared to commend its use as an analgesic pure and simple, my own experience—comprising rather a long series of cases—being that whenever any part of the operation would really produce actual pain the only method of eliminating shock is the induction of anesthesia." "Analgesia may be excellent in selected cases; we are perfectly willing to accept the statements of those who report this: but I should like to know whether or not, at critical moments during their operations, anesthesia is not induced?" "A trained and experienced assistant should always be present." "*Nitrous oxide and oxygen in unskilled hands is more dangerous than either ether or chloroform.*"

In other words, in analgesic work there is the tendency of the patient coming out from under the influence of the gas and suffer from the effects of shock due to the acuteness of the suffering; or, on the other hand, of anesthesia being produced with its dangers in the hands of the novice. Some of the best obstetricians are confessedly poor anesthetists.

To sum up: nitrous oxide-oxygen analgesia or "obstetric" ether or chloroform for the second stage pushed to anesthesia for the perineal stage. Possibly forceps delivery with vapor anesthesia to eliminate part of the second stage.

Nitrous oxide-oxygen analgesia or anesthesia is superior to any other during labor because of its oxytoxic action.

Eventually an established method of painless labor may be related to public health questions.

Lessening or abolishing the pain of labor may in the future limit birth control and criminal abortion.

Drug addiction after a prolonged drug narcosis in the neuropathic, is a possible contingency.

The dangers to the unborn or newly-born child are negligible when drug narcosis is limited to the first stage.

DISCUSSION

Dr. Collin Foulkrod.—Mr. President: I desire to make some remarks upon this subject based upon 32 cases, personally observed and attended by me. Of this number 19 were primipara, and 13 multipara. The average time in labor was 14 hours. There were 22 L. O. A. presentations; there were 4 R. O. P. presentations; there were 3 R. O. A. presentations, and 1 face presentation. There were 8 forceps deliveries, but only 2 above the perineum. All children are living, and all mothers are living.

Regarding nitrous oxid analgesia during labor, I will say that the conclusions are not yet matured, but I will add one point

of view to the large number of cases collected today. The fact that the number of cases was so small brings out to my mind one of the strong criticisms against such methods.

There are only 24 hours in each day, and stretch them as we may, an obstetrician must, at least, eat. If the development of these methods of analgesia is demanded by our patients, they must perforce engage two physicians, that they may act in relays, as it were; both must be competent to judge of the effect of the anesthestic used upon both mother and unborn baby. I have not as yet reached such a stage that I can with equanimity go from a house and allow a patient and even a nurse to continue anesthesia over hours of time without some method of checking results. Are our patients willing to compensate us for such service?

It is unjust and perhaps dangerous to the best interests of the patient to ask the attending physician to minutely attend for hours without rest, and then to find the grave necessity of some serious obstetric operation facing him at a time when he is both mentally and physically exhausted.

At times, our best judgment is matured away from the bedside in such exacting work.

There is no known method of accurately checking up the effect upon the child in utero of any anesthesia administered to the mother.

To advance the idea that careful watching of the fatal heart sounds will show variations meaning danger to the child, evidences an entire ignorance of the principles of acoustics and of the normal variations of the heart sounds occurring during the mechanism of labor.

A few concise questions briefly answered from my experience is all that the time allows.

1. Does nitrous oxid anesthesia quiet the patient? Yes, decidedly so, when given during labor pains. I have found all patients complain less, are quieter between pains, and while some aver that it is not as highly anesthetic as ether, which they have had before, they receive the measure of analgesia that the operator wishes.

2. Does it quiet the subjective sensation of pain? In 50 per cent. of cases decidedly so. In the balance, perhaps because of a tolerance, too much of the gas was required to get good analgesia. By this I mean that, after finding the usual quantity

needed for the average pain in the average woman, I hesitated to go beyond that quantity for reasons given below.

3. Does it retard or lengthen labor by quieting sensation of pain? This I must answer, yes, if pains are very frequent. Even with such a fleeting anesthetic as nitrous oxid I have found that at the end of almost an hour the patient becomes saturated and does not wake up as readily. When ceasing to give the anesthetic for a time, several pains will elapse before they again complain severely.

4. Does it stop uterine contractions? All anesthetics will stop uterine contractions if pushed far enough; nitrous oxid in a less degree than chloroform, morphia, or ether. Each patient reacts differently, and it requires trained watching to prevent deep anesthesia even with the gas.

5. Does it relax the cervix? To my mind, I have never seen a cervix relaxed by nitrous oxid. It is, however, true that relieving the fear of pain always allows of more strenuous effort on the part of the patient, and more rapid progress is made on her part in approaching an average physiological relaxation of the cervix by her own efforts.

6. Does it relax the perineum? Here also the answer is no; that any direct relaxing effect such as we attribute to chloroform, in this stage of labor must be denied. I am still of the opinion that ether skillfully given, or perchance, chloroform, is the ideal anesthetic when the head is passing over the perineum.

7. Does it relax the patient muscularly? Again, we have failed to secure sufficient relaxation to apply forceps or properly insert stitches. This not because of lack of anesthetic effect, but because of a curious spastic jactitatory stage, which it has been my observation for years is present in continued nitrous oxid anesthesia.

8. Does it nauseate the patient? If given long enough it does. My number of cases of nausea cases is perhaps deceptive, being only 15 per cent. But if continued long enough, there occurs an active nausea and vomiting, which may be an aggravation of a preëxisting nausea caused by the stretching of the cervix. In some instances, however, it is distinctly produced by putting the mask over the face and starting anesthesia.

9. Does it asphyxiate the baby? In about 50 per cent. of cases, when the anesthetic has been used in both first and

second stages of labor, or for sometime during labor, the babies are born blue, but seem to cry vociferously immediately upon being born, and appear to be in no way harmed by the anesthetic, the color clearing up in the usual time. In the balance of cases the babies seemed normal. I have not had any baby die after this method of anesthesia.

10. Does it compare with ether and chloroform for the same purpose? Excepting for the relaxing effect upon the perineum, or when doing a version. I do not think chloroform should be given during labor, because I believe that in ether we have a much safer anesthetic which will accomplish the same purpose.

I am confessedly a straight ether enthusiast. I have tried other anesthetics, and am trying in an impartial spirit the present one, but up to the present writing I fail to see where nitrous oxid can be used that ether could not be used by a skillful man, and with much better effect to both patient and operator. With this exception, nitrous oxid is a gas and ether must be vaporized; the former is therefore much more quickly available and will be so until the attempts now being made to do so give us a much quicker method of vaporizing ether. My point here then is this, that given ether in a vapor state, or shall we say an anesthetist who has learned how, by apparatus or otherwise, to secure the true vapor mixture with ether, necessary for anesthesia, that then ether enters into competition with nitrous oxid for this purpose.

Either one of two things is true: The nitrous oxid sold in cylinders on the market is a very dilute gas, or the claims of nitrous oxid enthusiasts are not proven.

The only thing proven in the cases coming under my observation is that the patient comes out of the anesthetic quickly. Certainly, in the majority of cases, she does not go under it quickly and it seems to take an enormous amount of the gas to make any patient acknowledge that she did not feel any pain. This without much oxygen in the mixture.

It may be true that the type and severity of the pain before us is much different and so much greater than anything for which nitrous oxid has previously been used, that I expect some magical effect in all cases. Certain it is, that in a few cases in the series, in which experimentally I would use nitrous oxid for a few pains and then ether for a few pains, and then chloro-

form in the same patient in one labor, the effect of the nitrous oxid was as good subjectively as was either of the other two.

The question of whether part of the analgesic effect may not be produced by the deep breathing advised when using the gas, has not been in my mind fully cleared up. Many of us have noted almost suggestive or hypnotic anesthesia by such a method before we ever thought of nitrous oxid.

11. Does it produce bronchial irritation? None of my cases manifested any continuance of irritation, and in those cases where any suggestion of bronchial irritation arose, I feel sure it was due to the then prevailing epidemic infections.

12. Does it produce irritation of the kidneys? I found that the number of catheterized specimens sent after labor was inadequate to form any conclusions.

Dr. John Osborn Polak.—After listening to Dr. Edgar's presentation of this most important subject, there is very little to add except to give our personal experience, which includes the use of morphin-scopolamin in something over 500 cases, the use of gas and oxygen in over 100 cases, of demorphinized morphin in 25 cases, and heroin in 25 cases. From this experience we have drawn some definite conclusions. Our results are about as follows: In over 500 cases, the last time we went over our records, there were four fetal deaths. Of these four fetal deaths, all the children were autopsied. There were three at full term, and these babies died in from 24 to 96 hours after delivery. The autopsies showed in one a diaphragmatic hernia, in one atalectasis, in one hemorrhage into both suprarenal capsules, and in a fourth we were unable to find any cause of death explainable except that the child was premature and the death was the result of a placenta previa delivery. There was one maternal death from postpartum hemorrhage in a case of placenta previa, where morphin-scopolamin was only used in the early part of the first stage and was discontinued after the second dose of scopolamin in a very long labor. A bag was introduced in this case, and I could not say there was any relation.

We understand scopolamin-morphin to have a definite place in obstetrics just as gas oxygen has a definite place, and each does a certain definite work and neither can do the work of the other. What we do now is to use morphin-scopolamin in the first stage of labor, its effect holds over long enough in the

second to relieve the terrible sacral pain which is not relieved by gas oxygen, and to employ gas oxygen in the second stage which will produce analgesia in a large percentage of cases, so that the labor is absolutely painless. After the delivery of the baby we give an extra dose of morphin-scopolamin, so that the surgical shock is absolutely annihilated.

The advantages of the relief of pain have been so well brought out by Dr. Edgar that I cannot add to them, except to say that we know definitely that the use of scopolamin-morphin shortens the time of the first stage of labor in primipare and carries the woman along to complete dilation of the cervix even in dry labors, which we are not able to do by any other method. You cannot carry a woman along twenty-four or thirty hours in the first stage of labor, as you can with morphin-scopolamin, without danger to the child, by any other method. There is no danger from scopolamin-morphin in the first stage of labor; the danger is the second stage of labor and in the prolongation of the second stage.

With reference to heart cases, my associate is now pursuing a study of eight heart cases, all cases of decompensation, and I trust that sometime he will publish the results with the blood-pressure, the sphygmographic tracings, etc., so that the work done will bear scientific investigation.

Clinically we have found less apprehension in these heart cases when morphin and scopolamin is used. The anesthetic blunts the pain and allows completion of the first stage without strain. We all know that the second stage can be surgically terminated if there is full dilatation for this reason we should accept this, as we have the advantage that it will permit time for full dilitation of the cervix. It is a valuable adjunct in heart cases, and has some advantage, and should be endorsed by the obstetrical profession.

Dr. Walter P. Manton.—I have looked over a number of my cases records, but I have not them with me. Having gone through nearly all of the methods which Dr. Edgar has mentioned, with the exception of scopolamin-morphin, which never appealed to me, I have finally settled on Pantopon and chloroform; the former is administered hypodermically, one ampule of 1 c.c. during the first stage of labor. In fully 75 per cent. of cases the results have been eminently satisfactory to both the patient and myself. In 25 per cent. of the cases a second

ampule may be given after a couple of hours, and if that is not effectual, the administration of chloroform completes the successful treatment. In the majority of these patients the results are practically the same as those obtained by the advocates of twilight sleep. The patients awaken from their labor and are unconscious of the birth of the child. They awake in a vigorous condition, and there are no untoward sequelæ. As far as the infants are concerned, I have yet to lose an infant from the administration of this combination and in only two or three instances perhaps has the child been slightly affected. Years ago, when we gave a quarter of a grain of morphin to prolong the anesthesia, asphyxia often resulted, but I have failed to see this following the employment of this combination.

Dr. Robert L. Dickinson.—It is gratifying to see the old chloral method revived. We see a more imperative study of the early stage of labor stimulated by Dämmerschlaf. I would emphasize or elaborate the point made, but not sufficiently distinctly, that almost all gas-oxygen apparatus should contain an ether attachment for delivery. We can switch on the ether in addition to gas oxygen if we wish. My constant use of it in gynecological surgery has taught me its comforts for obstetrics. Let it be said, however, it is a method for the expert. It is costly and cumbrous. It requires a resident anesthetist. Gas-oxygen anesthesia in my experience enables us to sew up the perineum at once without relaxation of the uterus and hemorrhage such as chloroform often produces.

Dr. W. Francis Wakefield.—Of all the topics that have been presented for discussion in this Society during recent years, none have been more important than this question concerning the use of some practical anesthetic in labor.

The agitation that has been noticeable, both in the lay and scientific press of this country, during the last two years, is evidence of the realization of a long-felt need that it is up to the conscientious, humane and scientific obstetrician to supply. It is obviously the duty of this organization, the first to recognize the special need of womankind, to take serious cognizance of the present-day demand, and to give the seal of its approval to any and all means which experience has proven to be safe and efficient in lightening the special burden which falls to the lot of women.

Childbearing among the women of today, with the type of

nervious system which culture and education have developed, is unquestionably a formidable experience, productive, in its general results, of a great deal of physical wreckage, most of which is avoidable.

Because custom has made us look with tolerance and complacency on the suffering endured by women during labor is no reason why women should be allowed to continue to suffer when such suffering is avoidable, and that it can be avoided is an unquestionable fact.

Moreover, the intelligent women of America are daily becoming more cognizant of the fact that there exists means to alleviate their distress, and naturally are coming more and more to the point of expecting such means to be used. They consult their accoucheur and generally meet at his hands discouraging criticism of the different methods that have been successfully practiced. It is this opposition of the profession that is doing more than anything else to retard the progress of the use of anesthetics in labor. Groundless criticism, however, cannot long or successfully endure against an aroused public opinion, particularly when that opinion is well founded. For the most part, this criticism comes from men who have never personally used any of the prevailing recognized methods. Perhaps a general antagonism has been created by the undesirable publicity that has attended the use of the scopolami method. To those who have used a good method and still condemn it, I can only say that somewhere there has been something faulty in its application, for I know that at least one method is capable of consistently satisfactory application.

Anesthetics in labor have come to stay. They mean too much to the economic life of women to pass into disuse. Dissatisfaction with the old régimé will become more and more pronounced as time passes. It behooves those of us then who practice obstetrics to consider well our attitude toward those means that have been successfully used by reliable members of our profession for the elimination of conscious pain in labor. It is much wiser for us to voluntarily advocate some good method now, than to have such advocacy eventually forced on us by public demand.

Each of us must choose the means which, from his own personal experience, is productive of the best results. In doing so, however, let us refrain from any obstructive criticism

or other means which in the hands of other men have given good results. Let us welcome any means which has the main object in view and time and the varied experience of many observers will eventually settle the question of the inferiority or superiority of this method or that.

For two years in my private practice I have been using scopolamin as a continued anesthetic. One hundred and seventy-five patients have been thus treated. In my hands scopolamin has proven itself to be an absolutely ideal anesthetic in labor. It would be difficult for me to picture anything more satisfactory. I have yet to meet the patient on whom it has failed to work satisfactorily, and I have yet to see a single contra-indication for its use. It disturbs none of the vital functions; on the other hand, conserves them, nor are the labor pains rendered less efficient.

Sanely used, scopolamin is a perfectly safe anesthetic. The best interests of both the mother and baby are subserved by its use. Its efficiency is entirely dependent on the reliability of the preparation used, and on the skill and good judgment shown in its administration. Perfection of result increases with experience.

Rather ideal conditions and surroundings are required for its success. For this reason it might fail to give satisfaction in the crowded wards of hospitals devoted largely to clinical work, especially where there is insufficient funds provided for the obstetric service. In private practice, however, most men who wish to take the trouble to do so could very easily create conditions that would make its use in every way practicable.

I present case records of one hundred consecutive cases taken at random from my case book. They speak for themselves. A brief résumé is attached which I believe would be representative of any number of cases.

Of stillbirths there were 2. One of these was a high forceps delivery and probably should have been delivered by Cesarean section; and the other was an anencephalic monster which could not have survived birth anyway.

Ninety-seven cases belonged to class 1. Class 1 means patients who have no knowledge whatsoever of their labor from the time they go to sleep until they wake up and find their babies born. Three cases belonged to Class 11. Class 11 refers to patients who carry away from their sleep some unim-

portant recollections of occurrences but no recollection of pain. Of these 100 cases, 50 were primipara and 50 were multipara; the average length of time of the labor was for primipara 13 hours and 20 minutes; for multipara 9 hours and 10 minutes.

There has been no case of postpartum hemorrhage.

Dr. J. Clifton Edgar (closing).—I have nothing to add in particular to what has been said except to thank the gentlemen for taking part in the discussion. From the resume I have presented I tried to concentrate attention on the first stage of labor which is a difficult problem to meet. We can easily take care of the second stage, but the problem is still unsolved as regards painless labor in the first stage. Painless labor is a necessity in many neuropathic women.

The only point I would refer to is the one made by Dr. Polak. I think it is an excellent thing postpartum to give these women a dose of some sedative, whether it be morphin and scopolamin or some other sedative. That certainly will add to the amnesia of the woman if she has six or four hours sleep after the birth of the child and is a shock preventive, and I shall make use of it in the future, as I have in the past.

IMMEDIATE COMPLETE AMPUTATION OF THE UMBILICAL CORD

By Robert L. Dickinson, F.A.C.S.
Brooklyn, N. Y.

Again, after nearly twenty years, I bring forward the petition that the only piece of surgery which has to be done on every human being should have its standard set not by midwife timidity, but by the simple principles of surgical practice.

A bettered detail is presented, but no new argument. The issue is simple. It is surgery against slough; primary union against slow granulation. With the line of demarcation clearly foreknown, surgeons cut away what is sure to drop away, then ligate, then close in the raw surfaces.

The detail referred to is an outward drag on the skin of the skin cuff of the cord to draw a fold sidewise away from the vessels for the needle to pierce, first on one side, then on the other. Thus the fearsomeness of prodding a vessel, that seems to withhold some men from suturing, is banished.

OUTFIT

Needle, straight or curved, with cutting point; the point tested for sure sharpness.

Stitch, fine silk or linen or silkworm, threaded into needle before boiling.

Thumb forceps or mouse-tooth thumb forceps.

Needle holder, if curved needle is used; better for all needles, as it saves touching the needle; needle placed in needle holder before boiling.

Boiling the above in towel or in tray or dish. Not removed from towel or tray until used.

Sterile gauze; one or two safe towels; binder.

STEPS

1. At the very last moment of the exit of the navel of the child from the vulva a clean towel covers the cord and encircles the trunk.

2. The cord is clamped long and cut long.

3. Later, when the mother is cared for, child and outfit are laid on the table (Fig. 1). One hand of the nurse holds the baby's legs downward and towels are placed to cover the child. By means of the clamp placed at birth the cord is lifted straight up with the nurse's other hand. Thus the skin cuff is drawn out to its full length. Thumb forceps seize half of the skin cuff, at right angles, at its middle, sliding the skin sidewise away from the vessels. Whereupon the needle pierces and takes up all of this upright fold, near its base, near the belly, and the thread follows. The opposite side is treated in the same fashion, entering near the first entry, coming out near the first exit. We thus have a combination of buried ligature and inrolling skin suture.

4. The loop is held to one side and the cord, still held tensely upward, is cut away at or just beneath the skin edge. All white surface must come away, and all or nearly all the jelly should come away also.

5. The stitch is tied, the skin inrolling altogether or nearly so.

6. A dry dressing is applied, whereby the edges roll themselves in completely.

7. One or two days later the stitch is cut and removed.

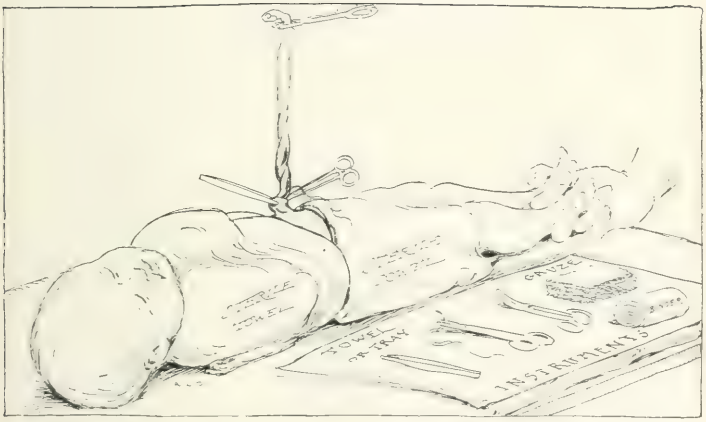


FIG. 1.—Immediate Amputation of Cord. Stitch Ligature Placed Before Cutting Off Cord.

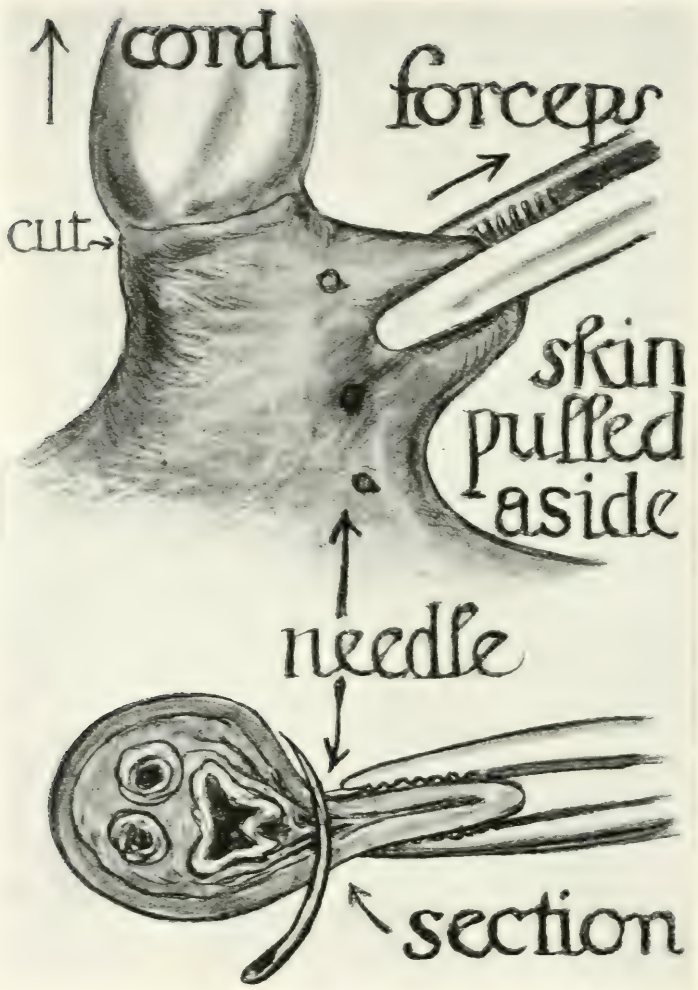


Fig. 2

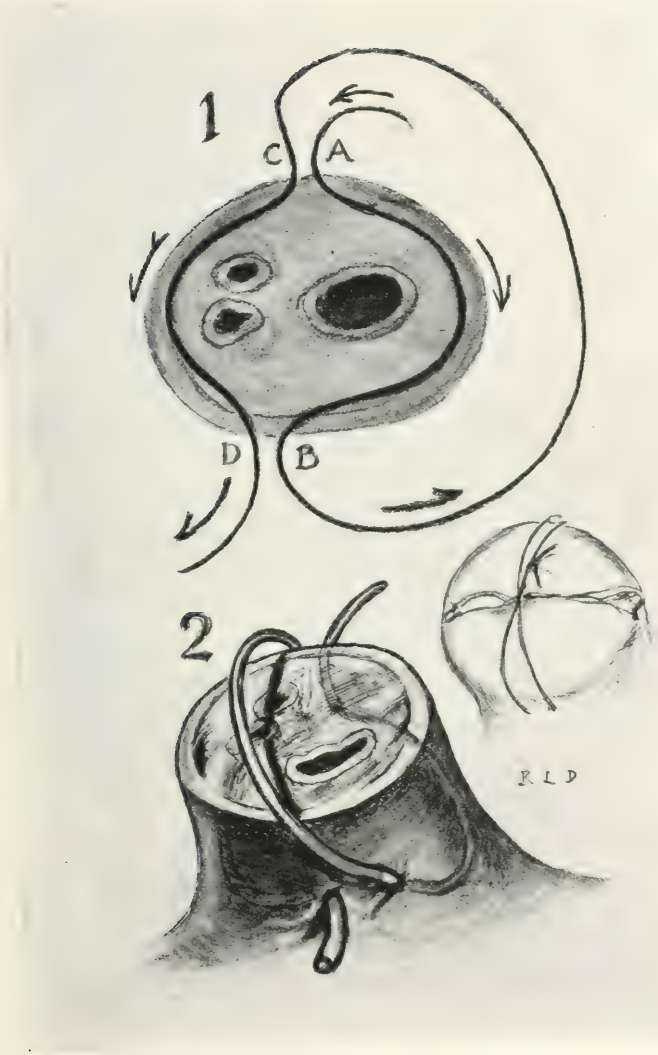


Fig. 3

This inrolling suture ligature I have used for fourteen years or more. It is simple to apply, but less easy to describe. The diagrams (Figs. 2 and 3) will make it clear. Half the cord is circled subcutaneously (*A–B*) in the fat layer. Then the needle is carried outside to re-enter (*C*) near the first entry in order to encircle the other half of the cord, making exit (*D*) close to the point of exit (*B*) of its first trip. When this ligating stitch is tied the loop and the tied ends crossing the open surface draw together its two sides. Even if actual apposition of the skin edges does not result, the invariable habit of the navel to retract within an hour or two secures apposition of the edges, and these edges are sealed by a small blood clot or by dry serum. Primary union occurs except where the amputation has been too high, leaving a certain amount of the shining covering of the cord or of jelly. Therefore one should see to it that he fearlessly cuts through and even carries away a little of the thin skin edge in order to provide raw edges to unite. A very sharp cutting needle is needed, and sharp scissors, as no skin is tougher than that hereabouts.

The after-care consists in dry dressing with plain gauze or in any other fashion favored by surgeons for wounds where primary union is desired and where the stitch is to be removed within a couple of days. The best suture material is fine silk or linen, either plain or impregnated. Silkworm is a bit clumsy. Catgut usually works well, but does not live up to the best surgical technic, and may produce redness by the second day unless No. 0 is used.

Oozing has not occurred, nor has sepsis. Theoretically the vessels might be supposed to retract inward, away from the grip of this ligature. Practically they are so adherent to the somewhat rigid sides of the opening that they do not slip.

Clips of various forms have been tried. Because of the general fear of the needle, I devised, many years ago, various

substitutes in the way of clamps with needle points to bite into the skin, some held by a lock, others by a spring. All have been abandoned. Michel clips, particularly in the large size, are effective, but do not give assurance of vessel seizure. In using them the skin cuff is secured, held aloft between thumb and finger, or by a transverse clamp with fairly springy blades until the clips are in place. Those familiar with clips may be more at home with this method. The original publication showed other experiments, such as separate ligature of the vessels, but these were soon abandoned.

The closure of the normal hernial opening—the umbilical—and the prevention of later bowel protrusion would not seem to be favored in any measurable degree by this procedure. The reason is that this suture does not bring into apposition denuded fascial surfaces. The most we do is to close the gap, and this gap is made up of the lumen of the umbilical vein.[1] If suture ligature at the level of the recti muscles or their sheaths causes agglutination of the vein wall and provides for the absence of a clot at this level, then we have favored or hastened closure of the hernial gap. I have not made more than nine tests of placing deep-dipped fascial bites.

Infection is, of course, invited by any lack of good technic, and it is not to be supposed that a midwife will be trusted with this method. But any student who can sew up a scalp wound can put two stitches in a navel. Where the vulva is unclean or the navel of the child has come against feces expelled with the birth, or in a breech delivery—in other words, where contamination of the navel has occurred—one is not called upon to invite trouble by stitching. The one infection I have heard of was the result of the work of an interne under one of these conditions. Dr. Fry tells me he

[1] Cullen, T. S. Embryology, Anatomy, and Diseases of the Umbilicus, together with Diseases of the Urachus, 1916, pp. 45, 46 and 97 to 100.

had oozing once. As far as I know other men have not had unfavorable results to report, not having tried it. I have only one group of converts. All the nurses who see the after care, namely, a cord sealed, closed, clean, requiring no dressing, are keen about a process that risks no breaks of their surgical cleanliness from daily dressing of a sloughing wound.

The proposition to suture ligature was made in 1899.[1] Nothing ever fell flatter. At most it has been dismissed with a footnote of ridicule. But its adoption seems to me inevitable as soon as men midwives are trained to do cleanly minor surgery.

[1] Dickinson, R. L. Is a Sloughing Process at the Child's Navel Consistent with Asepsis in Childhood? American Journal of Obstetrics, June, 1899.

W. E. Morley.

IN MEMORIAM

WILLIAM EDWARD MOSELEY, M.D.

By J. Whitridge Williams, M.D.

William Edward Moseley, son of Charles Benjamin and Emeline (Foster) Moseley, was born at Petersham, Massachusetts, May 22, 1848, and died at Baltimore, February 10, 1915. He received his preliminary education at Medford, Massachusetts, and at the age of fifteen accepted a mercantile position in Boston. As his disposition was studious, he continued his studies while at work, and four years later entered Antioch College, Yellow Springs, Ohio, where he remained for three years. During that time he was obliged to earn the money necessary to defray his expenses, and, breaking down under the combined strain of work and study, he left college before obtaining the baccalaureate degree.

He entered the Harvard Medical School in 1870, and received his doctor's degree in 1873, being a member of the first class to complete a three-year course in that institution. Immediately after graduation he served a year as interne at the Massachusetts General Hospital, and later assisted Dr. George C. Shattuck at the Good Samaritan Hospital and in his private dispensary.

He settled in Baltimore in 1876 and engaged in general practice, but becoming particularly interested in gynecology, he gave up his practice in 1880, and went to New York, where he received an interne appointment at the Woman's Hospital and served for the year 1880–1881. While there he was greatly impressed by the ability and personal qualities of Emmet, and formed so personal a friendship for him that he named a son, born in 1886, for him.

Upon returning to Baltimore in 1881 he devoted himself exclusively to gynecology and obstetrics, and soon built up an extensive practice. For many years he was gynecologist to the Union Protestant Infirmary, and upon resigning from the staff of that institution he opened a private sanitarium, which he conducted successfully until he retired from practice shortly before his death.

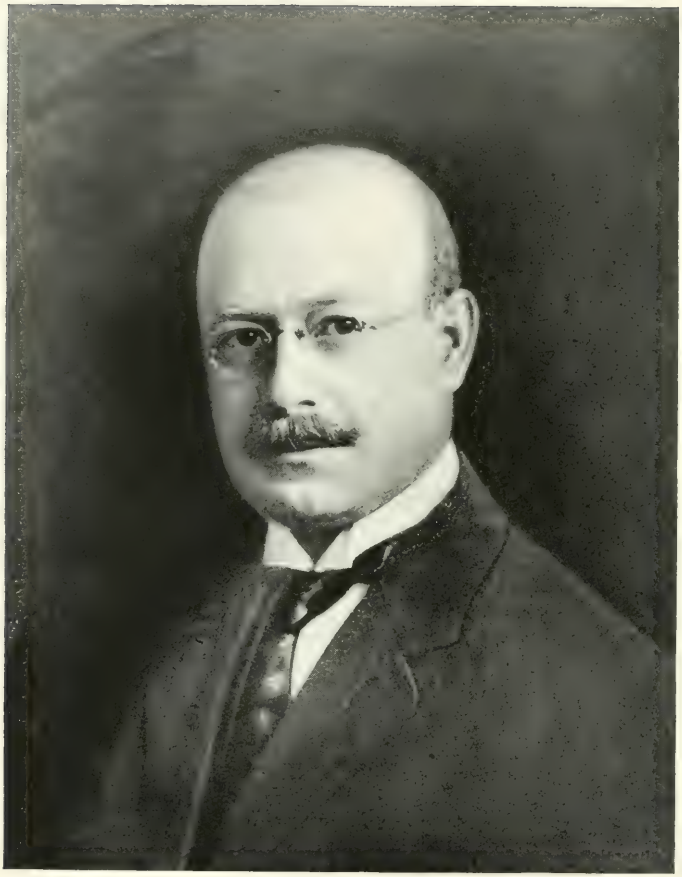
He became professor of gynecology in the Baltimore Medical College and gynecologist to the Maryland General Hospital in 1897, and filled these positions acceptably for twelve years, when, finding the duties onerous, he resigned and was made Professor Emeritus.

He was elected a Fellow of this Society in 1891 and served upon the Council in 1897. Although he made but few contributions to its TRANSACTIONS, he was immensely interested in its work, and regularly attended the meetings until his health began to fail.

After returning from New York he took an active interest in the medical and intellectual activities of his adopted city, became a member of many civic and professional societies, and served as president of the Gynecological and Obstetrical Society of Baltimore, and of the Clinical Society of Maryland. He was also president of the Alumni Association of the Woman's Hospital of New York.

Dr. Moseley was not a frequent contributor to medical literature, but was a thoroughly sound and conscientious gynecologist, who made the welfare of his patients his prime interest, and consequently had many devoted friends. I was fortunate enough to enjoy his friendship, and am glad to avail myself of this opportunity to bear witness to his upright character, and to express my appreciation of many kindnesses shown me as a young man. He never forgot his New England ancestry and traditions, was intensely proud of his Harvard training, and made a graceful president of the Harvard Club of Maryland.

In 1879 he married Elizabeth Buchanan Riley, daughter of Dr. William Riley, of Baltimore, and had four children, two of whom survive him: Wm. Edward, Jr., and Thomas Addis Emmet Moseley. His married life was a happy one, and the loss of his wife several years before his death was a grief from which he did not recover.



Samuel M. Brickner

SAMUEL M. BRICKNER, A.M., M.D.

By Robert Tilden Frank, M.D.

Samuel M. Brickner, a Fellow of the American Gynecological Society since 1913, at the age of forty-nine years, died on May 5, 1916, at Saranac Lake, N. Y., after a long illness, the final outcome of which he faced with remarkable courage and cheerfulness.

He was graduated from the University of Rochester in 1888, and in 1891 from the New York College of Physicians and Surgeons, where he took the first Harsen Clinical Prize. Thereafter he served on the resident staffs of the Sloane Maternity Hospital and the Mount Sinai Hospital, New York. For ten years he was Associate Attending Gynecologist at Mount Sinai Hospital, until in 1913 ill health compelled his resignation.

As a medical student, and for many years after, Dr. Brickner was an assistant editor of the *New York Medical Journal*, and contributed several articles to Foster's *Encyclopedia of Medical Reference*. His contributions to the literature of obstetrics and gynecology were also many and notable; among these were his observation of certain signs and symptoms indicative of "The Short Cord" (*American Journal of Obstetrics*, 1902, xlv, 512), and his description of "Fibroma Molluscum Gravidarum as a Heretofore Unrecorded Clinical Entity" (*American Journal of Obstetrics*, 1906, liii, No. 2).

Of gentle spirit and pleasing manners, Dr. Brickner had an unusual capacity for making friends, and he had many within and without the profession. Among his colleagues he was universally liked, and generally admired for his high ideals, his broad culture and his literary talent, expressed alike in his medical writings, his letters (of which, especially those written to friends during his illness are models of elegant diction and of sentiment) and his verse. At the banquet of the American

Gynecological Society held in 1909 to celebrate the centennial of the foundation of abdominal surgery, he read the poem of the evening, "Ephraim MacDowell in 1809."

When his failing strength finally separated him from the clinical work he loved, and which, in spite of the symptoms he recognized, he had bravely struggled to continue, Dr. Brickner promptly and cheerfully turned to these literary talents to continue the medical career which he was unwilling that anything but death itself should terminate. It was then that he edited, from its inception, *The Medical Pickwick*, a unique monthly magazine of fiction, verse, humor, anecdote, history, and biography. He also joined the editorial staff of the *American Journal of Surgery*, and prepared the abstracts of gynecological and obstetrical articles. At this time, too, he wrote verse for various magazines and newspapers, much of which was widely quoted, especially "The Anti-Vivisectionist," "The Red Cross Nurse," and "To R. L. S.," the dedication poem read at the unveiling of the monument to Robert Louis Stevenson at Saranac Lake. Most touching of all these was his own valedictory, written a short time before his death and published in the *New York Times*. He called it "The Feast:"

"There is no more Lucullan feast than this
At which I daily sit:
Laughter and sunshine, love, a tender kiss—
These are the sweets of it.

"If, by chance, black stormclouds lowly bend
My unresisting head,
It is no symbol that my joy shall end,
For still my feast is spread.

"A day will come with laughter just as sweet,
The sun will fill the air,
Love still be young, but other lips will meet:
I shall have had my share!"

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